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S. Hrg. 99-707, Pt. 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND CERTAIN INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

ON

H.R. 5313

AN ACT MAKING APPROPRIATIONS FOR THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS, AND OFFICES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1987, AND FOR OTHER PURPOSES

PART 2—(Pages 479–1026)

ENVIRONMENTAL PROTECTION AGENCY
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NATIONAL CREDIT UNION ADMINISTRATION
NATIONAL SCIENCE FOUNDATION
OFFICE OF REVENUE SHARING
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

TUESDAY, FEBRUARY 25, 1986

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10 a.m. in room SD–124, Dirksen Senate Office Building, Hon. Jake Garn (chairman) presiding.

Present: Senators Garn and D'Amato.

DEPARTMENT OF THE TREASURY

OFFICE OF REVENUE SHARING

STATEMENT OF MICHAEL F. HILL, DIRECTOR

ACCOMPANIED BY:
ROBERT W. RAFUSE, JR., DEPUTY ASSISTANT SECRETARY (STATE AND LOCAL FINANCE)
KENT A. PETERSON, DEPUTY DIRECTOR

BUDGET REQUEST

Senator GARN. The subcommittee will come to order.

We will begin today with the Office of Revenue Sharing from the Treasury Department.

Mr. Hill, I wish to welcome you, Mr. Rafuse, and your associates to this hearing on the fiscal year 1987 budget.

Title I of the State and Local Fiscal Assistance Act of 1972, as amended, provides for the distribution of funds in fiscal year 1986 to approximately 39,000 units of local government. For fiscal year 1985, $4.57 billion was appropriated. For fiscal year 1986, $4.185 billion was appropriated for distribution to local governments.

This year you are not requesting any funds for payments to local governments and propose to terminate the General Revenue Sharing Program on September 30, 1986, at the time of the expiration of the current program authorization.

You are requesting $5,560,000 and 75 average positions to cover the salaries and expenses of the Office of Revenue Sharing. This is a decrease of $2,154,000 from the fiscal year 1986 appropriation.

Please go ahead with a summary of your statement.

PREPARED STATEMENT

Mr. HILL. Mr. Chairman with your permission, even though I have a short statement, I would like to submit it in total for the record and we can go to questions and answers.

[The statement follows:]

STATEMENT OF MICHAEL F. HILL

Mr. Chairman and members of the subcommittee, I am pleased to appear before you today to discuss the appropriation request for fiscal year 1987 of the Treasury Department, Office of Revenue Sharing.

Appearing with me are: Robert W. Rafuse, Jr., Deputy Assistant Secretary (State and Local Finance); Kent A. Peterson, Deputy Director, Office of Revenue Sharing; Mary Beth Shaw, Director (Financial Management); and John F. Benton, Deputy Director (Financial Management).

In addition, I have with me several key members of the staff of the Office of Revenue Sharing upon whom I may call for information when appropriate.

PROGRAM MISSION AND RESPONSIBILITIES

The Office of Revenue Sharing, a unit within the Office of the Secretary of the Treasury, administers the Revenue Sharing Program. The program was established by the State and Local Fiscal Assistance Act of 1972 and reauthorized in 1976, 1980, and 1983. Payments to local governments under the program are currently authorized through September 1986. The 1986 appropriation for revenue sharing was $4.185 billion; this level is reduced by 4.3 percent, or about $180 million, under the Gramm-Rudman-Hollings sequestration.

The administration is proposing to rescind this year's final quarterly payment to local governments. This proposal, if enacted by the Congress, would result in a reduction of approximately $760 million in the amount appropriated for the trust fund for fiscal year 1986 and would reduce 1987 outlays by a like amount.

The Revenue Sharing Program has provided general fiscal assistance, distributed by statutory formulas, to approximately 39,000 general-purpose local governments.

The resources of the Office of Revenue Sharing have been primarily devoted to two major tasks: making payments and ensuring compliance with the nondiscrimination, audit, and public-participation standards of the Revenue Sharing Act. The first task has included obtaining and reviewing the data used in the allocation formulas; computing allocations; making, controlling, and documenting payments; and providing for the collection and control of required forms and information.

The second task involved responding to individuals' complaints as well as judicial and administrative holdings of discrimination, resolution of cases in which public hearing and notice requirements may not have been met, and ensuring that recipient governments receiving payments of $25,000 or more per year have completed required audits and that all recipients meet minimum standards of accountability for their revenue-sharing expenditures.

The Office of Revenue Sharing has also conducted a limited program of technical assistance and information to assist recipient governments and the public in understanding their responsibilities and rights under the act. Information and assistance concerning the Revenue Sharing Program have also been provided to policymaking officials in other Federal agencies and to Members of Congress.

LEGISLATIVE PROPOSAL

As you know, the administration strongly opposes the continuation of revenue-sharing payments to local governments after fiscal year 1986. Consequently, no budget authority is being requested for the trust fund for fiscal year 1987.

In the current fiscal environment, the Federal Government no longer has revenues to share with local governments. The shift of local tax bases to more broad-based revenue sources, like income and sales taxes rather than property taxes, should enable local governments to compensate for the termination of revenue-sharing payments. The administrtion strongly believes that these revenue source allocation choices are more appropriately made at the local level rather than continuing to borrow money at the Federal level to make grants to these localities.

OFFICE OF REVENUE SHARING SALARIES AND EXPENSES

Mr. Chairman, today we appear before you to request $5,560,000 for fiscal year 1987 for salaries and expenses and an authorized level of 135 permanent positions. We anticipate the need for 75 FTE work-years for fiscal year 1987 to oversee the orderly termination of agency activities.

My colleagues and I would be happy to respond to any questions you may have.

GRAMM-RUDMAN-HOLLINGS REDUCTIONS

Senator GARN. We would be happy to fill in.

The fiscal year 1986 HUD-Independent Agencies appropriations bill was passed with a reduction of $381,700,000 from the fiscal year 1985 level in the payments to local governments from the Local Government Fiscal Assistance Trust Fund. The Office of Revenue Sharing was directed that this reduction be taken in the fourth quarter payment in order to provide the local governments with as much time as possible to plan for the fiscal year 1986 budget.

Page 1 of your fiscal year 1987 budget justification specifies additional fiscal year 1986 reductions from the $4,185,000,000 appropriated.

Under Public Law 99–177, the Gramm-Rudman-Hollings Act, a $179,955,000 sequestration is proposed. When would you propose to take that automatic reduction in the payments to local governments?

Mr. HILL. At this time, Mr. Chairman, we are proposing to take that full decrease to the third quarter, which is our July payment.

Senator GARN. Gramm-Rudman appears to have special provisions for the sequestration of trust funds. What do you propose to do with these funds, since the program is scheduled to terminate?

Mr. HILL. You are quite correct, Mr. Chairman. What we are examining right now is a provision in the Revenue Sharing Act which gives the Secretary of the Treasury the authority to transfer funds that he decides are not necessary for payments to the general fund of the Treasury. We are researching that provision in the act. We think it may be an appropriate vehicle to use to transfer the funds to the general fund.

Senator GARN. Initial examination of the conference report that accompanies Gramm-Rudman lists a number of budget cuts and activities that shall be exempt from reduction. The list includes payments to Local Government Fiscal Assistance Trust Fund. That is on page 50.

Since it appears that Congress wished to exempt the trust fund, why did your justification show almost $180 million in reductions taken pursuant to 99–177?

Mr. HILL. Mr. Chairman, with your permission, since that involves a rather technical legal issue, I would like to defer to Mr. Richard Isen, who is the Chief Counsel of the Office of Revenue Sharing.

Mr. ISEN. Good morning, Mr. Chairman.

There are several essential points with respect to your question. First, the Gramm-Rudman-Hollings Act is intended to balance the Federal budget by 1991. Hence, it is very broad in its terms, and legal interpretations of it are being done in that context. Second, the Revenue Sharing Program is administered with two accounts. One is called a Payments to Local Government Fiscal Assistance Trust Fund and the second one is the Local Government Fiscal Assistance Trust Fund.

LOCAL GOVERNMENT FISCAL ASSISTANCE TRUST FUND

The payments-to account is the account into which the appropriated moneys are placed. They are then transferred to the trust fund account, and it is from the trust fund that the payments are made to local governments.

The Gramm-Rudman-Hollings Act only exempted one of these accounts, the payments-to account. It did not exempt the trust fund account. The purpose of this was so there would not be two sequestrations, one on the account called the payments-to account, and the second sequestration, or 4.3-percent reduction, on the trust fund account. Only one of these two accounts was exempted because Congress wanted a 4.3-percent reduction on the revenue-sharing payments.

So, for this reason, the administration has determined that the trust fund account is not exempted. That is, the account from which payments are made, and hence, the decision was reached that it was not, in fact, intended to exempt the payments for revenue sharing from the sequestration process.

This decision was made by OMB and the CBO when they were reviewing the entire panoply of Federal programs. We are informed that all trust funds are set up like the Revenue Sharing Program; that is, with two accounts, one into which the appropriated moneys are placed, and then a second account from which the payments are made.

The only programs that were considered fully exempt were those in which both of these accounts were exempted, specifically in Gramm-Rudman-Hollings Act. Since in revenue sharing only one of the accounts was exempted, and that was not the account from which the payments were made, the administration decided that revenue sharing would be subject to sequestration.

Senator GARN. You have obviously given us a legal answer. Have you researched what you believe the intent was?

Mr. ISEN. Yes, sir, and to the best of my knowledge, revenue sharing was, first of all, not specifically discussed in the conference report, and so the intent would have to be gleaned just from the statutory interpretation. Since it was treated differently from some of the other trust funds that were intended to be exempt, like the Social Security Trust Fund, the administration determined, on a uniform governmentwide basis, that there would be sequestration of these payments in these situations.

FISCAL YEAR 1986 RESCISSION

Senator GARN. Your budget justification identifies your proposed rescission of the entire fourth quarter fiscal year 1986 payments. This amounts to $759,975,000 for the payment that would be made on October 7, 1986.

The 45-day period for consideration for rescission, in this case April 15, 1986, could come and go without Congress taking any action.

If this should happen and the Congress decides at a later date to enact a rescission, what would be the impact on the payments to local governments?

Mr. HILL. Mr. Chairman, one of the critical elements that we have tried to maintain in the entitlement process is some stability during an entitlement period to the payment process so governments can plan their funds and be assured of getting that.

Obviously, such a move would—depending on how much the Congress reduced the last payment and when the reduction occurred—it would have an impact on that payment process stability.

Senator GARN. Frankly, I would be surprised, from the actions that we went through last year, if the rescission would come from Congress, but the most important thing in dealing with this issue is the uncertainty factor, as a former mayor, in trying to plan your budgets.

So whatever we do, the best help we could be to local governments would be to let them know what is going to take place.

Mr. HILL. Yes, sir.

TERMINATION OF REVENUE SHARING PROGRAM

Senator GARN. Will you be able to close out the trust fund on September 30, 1986, with existing legislation?

Mr. HILL. No, sir. There is a piece of termination legislation pending before the Congress right now in the Senate budget reconciliation bill. It contains two technical amendments or provisions that would facilitate the balancing of the trust fund by the end of this calendar year. One provision would have the effect of limiting the time frame that a government can challenge its data. Right now, the Revenue Sharing Act allows a local government to challenge its data for a full year after the close of an entitlement period. Obviously, if that is not changed, the governments will have a full year after September 30, 1986, to challenge the data.

I don't know whether the legislation that our termination proposal is contained in is going to move or not. You would probably be a better judge of that than I. But in the absence of that being passed, the answer to your question is "No." I won't be able to balance the trust fund before the Office of Revenue Sharing terminates at the end of fiscal year 1987.

FISCAL YEAR 1987 OMB REQUEST

Senator GARN. What was your initial fiscal year 1987 request to OMB for payments to local governments and also for the salaries and expenses of the Office of Revenue Sharing?

Mr. HILL. Our initial request for salaries and expenses was $5,858,000, and the trust fund request is the one that is in the budget. We ended up with $5,560,000 for salaries and expenses, so we had a $298,000 decrease between our request and what we are proposing here.

FISCAL RELATIONS STUDY

Senator GARN. Last year, with some minor assistance from the subcommittee, you were able to complete the congressionally mandated study of Federal-State-local fiscal relations.

Your general conclusion was that, almost without exception, the outlook for the finances of the State and local sector during the next 5 years is favorable and certainly brighter than that for the Federal Government.

Does the study provide any insight as to how the programs initiated by local governments could be maintained if the federally funded Revenue Sharing Program does, in fact, expire at the end of fiscal year 1986?

Mr. HILL. Mr. Chairman, with your permission, I would like Dr. Rafuse to respond to that question.

Senator GARN. That would be fine.

Mr. RAFUSE. Mr. Chairman, I would like to begin by reiterating my thanks, our thanks, for the efforts of the committee staff and yourself in assisting us with the financing of the completion of the work on the study.

The answer to your question is, in general, "Yes." That is, the studies provide a number of perspectives from which we can gain insights into how the State and local government sector will respond to the termination of the Revenue Sharing Program.

I think in general—and this somewhat anticipates a question you are fond of asking in these hearings—that the fiscal condition of the sector as a whole has continued to improve in the past year and the outlook is relatively bright for the future, assuming the economy remains strong.

This indicates that the State and local government sector as a whole has the capacity to respond to the relatively minor financial hit that is involved in the termination of the Revenue Sharing Program. The payments and Federal grants of all types are a far smaller proportion of State and local revenues today than they were back in the late seventies. What the Federal Government does with its budget and Federal grants to State and local governments is less important today than it was in years past.

There are a number of ways the State and local governments will adjust. I think a number of States are giving serious consideration to stepping in with assistance that will cushion the effects of the termination of revenue sharing on State and local governments. That is probably the primary form of adjustment.

Of course, as I have emphasized in testimony before and, as the administration emphasizes, many of the governments that receive revenue-sharing payments by no stretch of the imagination need them. Those governments will have a very easy time of adjusting to the loss on their own, the termination of payments.

Those that will have problems, in most cases, can expect assistance from their States.

USE OF REVENUE-SHARING FUNDS

Senator GARN. Very roughly, let me back up by saying that when I was mayor, which has been a long time ago, I didn't trust revenue sharing to continue to that time. So all of my revenue sharing, virtually all of the funds were used for capital improvements rather than putting them into operating expenses.

Do you have any general statement on that relationship of cities across the country where it hurt their capital improvements budget but they have been smart enough not to trust us all these years and have not been using it for operating expenses?

Mr. RAFUSE. That, of course, was a very common method of handling revenue sharing in the early days for the very reasons you indicated. It is a practice that declined over the years, as the program appeared to be secure.

Generally, I would say that the governments that do that, that have managed essentially to keep revenue sharing in a separate pot, have tended to be the better-off governments to which this increment of revenue represents discretionary income. When you have potentially temporary discretionary income, you decide whether you are going to buy a bigger car; you don't move immediately to a bigger house and build it into your basic budget.

So that is one of the ways that local governments will adjust to the termination of revenue sharing. They simply will have a slightly more modest capital improvements program than they might otherwise have had, and it essentially won't affect basic operating revenues or expenditures.

As I say, only the better-off local governments have been able to do that.

BACKLOG OF UNRESOLVED DISCRIMINATION CASES

Senator GARN. What are your goals for fiscal year 1986 and fiscal year 1987 to reduce the backlog of unresolved discrimination cases?

Mr. HILL. Mr. Chairman, we began fiscal year 1986 with 808 cases. We anticipate ending the year with 416, if not fewer. By the end of the program, we anticipate about 280 cases.

Senator GARN. So you expect to have 280 unresolved when the Office of Revenue Sharing goes out of business?

Mr. HILL. Yes, sir. We are making every effort to reduce that number even further, but 280 is our best estimate at this point.

LOAN GUARANTEE PROGRAM

Senator GARN. Although the Secretary's authority to issue guarantees expired on June 30, 1982, and the administrative expenses of the New York City Loan Guarantee Program were shifted to the Office of the Secretary, the subcommittee still continued to be concerned with the Secretary's ability to monitor the program until city's obligations are fulfilled. Last year, you indicated you would be through with the program within the next 3 years.

Is this schedule still a valid one?

Mr. RAFUSE. Mr. Chairman, I am happy to report that the schedule for concluding the Loan Guarantee Program has improved dramatically since we testified last year. Instead of the 3-year schedule that was in place last year and that we anticipated would be adhered to by New York City, in fact, the final guaranteed bonds will be retired this August. Essentially, the program will terminate in about 5 months.

The reason this is the case is that the city decided a bit less than a year ago that the interest rates they were paying on the guaranteed bonds—which had been sold, you will recall, at Treasury borrowing rates rather than tax-exempt rates—represented a rather serious drain on the city's cash flow, an expense they could do well without. Therefore, last summer the city sold nearly $600 million of bonds in an advance-refunding transaction and retired all but a $1 million portion of an issue that matures in August of this year.

Thus they eliminated all of the guaranteed bonds but this residual $1 million, which matures in August. The reason they did this was that there are some provisions of State law that permit the city to maintain some taxes for which the authority will expire as soon as the guarantees are all repaid. We evaluated the city's proposal a year ago and decided that it was reasonable in light of the acceleration, and the prepayment that would be involved. We decided it would be reasonable to permit them to leave the $1 million hanging on a limb, as it were, for another year to their advantage, and we agreed to permit the transaction.

In any event, the bottom line is that the program will close this August when that final issue is repaid. Our report to the Congress, which we will file at the end of the summer, will be our final report on that program, and we can close that book permanently.

Senator GARN. Gee, occasionally we do get good news in these hearings.

Mr. RAFUSE. It is a delight to deliver it.

SUBMITTED QUESTIONS

Senator GARN. Gentlemen, I have four pages of questions for the record. Thank you very much for being here.

Mr. HILL. Thank you, Mr. Chairman. We appreciate this subcommittee's review of our budget every year. Thank you very much.

[The following questions were not asked at the hearing but were submitted for response for the record:]

QUESTIONS SUBMITTED BY SENATOR GARN

Percent of local Government Taxes and Local Budget Coming From Revenue Sharing

Question: Two years ago, you testified that in FY 82 the percentage that Revenue Sharing funds represents of local government tax collections was 7% and in terms of local government expenditures, it was 2.5%. Would you please update these figures?

Answer: For fiscal year 1984, the latest period for which local fiscal data are available, total Revenue Sharing funding ($4.6 billion) was 5.9 percent of local government tax revenue ($78.0 billion) and 2.2 percent of local government expenditures ($210.2 billion). Revenue Sharing funding as a percentage of local government tax revenue and expenditures is declining because the payments have been constant while local government tax collections and expenditures have increased. For the current Entitlement Period 17 (October 1, 1985 - September 30, 1986), Revenue Sharing funding was reduced 8.36 percent in the HUD and Independent Agencies FY 1986 Appropriation Act to $4.2 billion from the authorized level of $4.6 billion. This will further reduce Revenue Sharing funding as a percentage of tax revenue and expenditures of general-purpose local governments.

OMB REQUEST VERSUS PRESIDENT'S BUDGET REQUEST
OFFICE OF REVENUE SHARING
SALARIES AND EXPENSES
(Dollars in thousands)

Question: Would you provide, for the record, a copy of the distribution of your budget by object classification contained on Page ORS-6 of your Budget Request and add a column indicating your Request to OMB?

Answer: Object Class: OMB Request versus President's Budget Request FY 1987.

		OMB Request	President's Budget Request	Diff.
1100	Personnel Compensation:			
	Permanent Positions	$2,886	$2,886	---
	Positions Other than Perm...	---	---	---
	Other Personnel Compensation	182	182	---
	Special Personnel Services Payments..................	---	---	---
	Total Personnel Compensation	3,068	3,068	---
1200	Personnel Benefits..........	393	393	---
1300	Benefits to Former Personnel	644	644	---
2100	Travel and Transportation...	142	78	-64
2300	Rents, Comm. & Utilities....	677	531	-146
2400	Printing and Reproduction...	---	---	---
2500	Other Services..............	906	818	-88
2600	Supplies and Materials......	25	25	---
3100	Equipment..................	3	3	---
	Total.....................	$5,858	$5,560	$-298
	Authorized Postions..........	135	135	---
	Average Positions............	75	75	---

Proposal to Terminate GRS

Question: Would you please briefly describe the effect on your major activities (in terms of dollars and personnel reductions) of implementing the proposal to terminate the General Revenue Sharing Program authorization and phase out the administrative effort?

Answer: Funding and personnel reductions in the three major ORS activities that would be associated with implementing the proposal to terminate the Revenue Sharing Program are summarized in the following table, which appears on page ORS-2 of the Office's FY 1987 budget submission.

Salaries and Expenses, Office of Revenue Sharing
Explanation of Program Changes for Fiscal Year 1987

(Dollars in thousands)

Activity	FY 1986 Authorized		FY 1987 Estimate		FY 1987 Program Changes	
	Ave. Pos.	Amount	Ave. Pos.	Amount	Ave. Pos.	Amount
1. Legal and Support Services	26	$1,766	15	$1,124	-11	$ -642
2. Operations and Technical Assistance	29	2,649	14	1,394	-15	-1,255
3. Monitoring and Enforcement	60	2,967	46	3,042	-14	+75
Total..................	115	$7,382	75	$5,560	-40	$-1,822

The funding and personnel figures presented in this table are the result of an analysis of the costs and staffing requirements associated with the proposed FY 1987 phasing out of the administration of the Program. The analysis included identification of critical staff positions in each of the three major ORS activities and estimates of how long various positions' services would be required during the FY 1987 close-down process. Although this analysis provides a basis for FY 1987 planning, actual average-position and cost figures might vary considerably as a result of unmanageable attrition.

SUMMARY EXPLANATION OF CHANGES REQUESTED FOR FISCAL YEAR 1987
OFFICE OF REVENUE SHARING
SALARIES AND EXPENSES
(Dollars in thousands)

Question: Would you please provide, for the record, a tabular Digest of Budget Estimates by Activities for FY 1987 displaying the FY 1986 appropriations level and the FY 1987 budget estimate identifying changes in the funding and positions.

Answer:

	I. Legal and Support Services			II. Operations & Technical Assist.			III. Monitoring and Enforcement			Total		
	Perm. Pos.	Ave. Pos.	Amount	Perm. Pos.	Ave. Pos.	Amount	Perm. Pos.	Ave. Pos.	Amount	Perm. Pos.	Ave. Pos.	Amount
FY 1986 Appropriation Enacted by Congress	32	25	$1,524	35	38	$3,067	68	67	$3,123	135	130	$7,714
Adjustments:												
1. Gramm-Rudman-Hollings Reductions	---	---	242	---	---	-418	---	---	-156	---	---	-332
2. Proposed Staffing Reduction..........	---	1	---	---	-9	---	---	-7	---	---	-15	---
Total Authorized Level for FY 1986...........	32	26	$1,766	35	29	$2,649	68	60	$2,967	135	115	$7,382
FY 1987 Changes												
1. Program Changes: The authorization for payments terminates on September 30, 1986. A complete phase-out of the S&E account by September 30, 1987 is proposed	---	-11	-642	---	-15	-1,255	---	-14	+75	---	-40	-1,822
Total, Program Changes..........	---	-11	-642	---	-15	-1,255	---	-14	+75	---	-40	-1,822
FY 1987 Congressional Request................	32	15	$1,124	35	14	$1,394	68	46	$3,042	135	75	$5,560

NATIONAL CREDIT UNION ADMINISTRATION

STATEMENT OF SENATOR ROGER W. JEPSEN, CHAIRMAN

ACCOMPANIED BY:

D. MICHAEL RILEY, PRESIDENT OF THE CENTRAL LIQUIDITY FACILITY OF NCUA
WILLIAM C. POLING, BUDGET OFFICER
ROBERT FENNER, GENERAL COUNSEL

OPENING REMARKS

Senator GARN. Our next agency is the Central Liquidity Facility of the National Credit Union Administration.

Senator Jepsen, it is a pleasure for me to have you before the committee. Today is your first appearance as Chairman of the National Credit Union Administration, and we welcome you here. It is not often that we have an agency which seems happy with their budget request, much less one that has been relatively unchanged over the past several years.

I notice that your prepared remarks are as brief as the agency has presented in the past. The resources needed to fully carry out what you have been asked for appear to be able to fully carry out the legislative mandate.

Senator Jepsen, please proceed with your statement.

Senator JEPSEN, Thank you, Mr. Chairman.

PREPARED STATEMENT

Mr. Chairman, I respectfully ask that my statement be entered into the record as if read, and I will summarize it.

Senator GARN. It will be.

[The statement follows:]

STATEMENT OF ROGER W. JEPSEN

Mr. Chairman and members of the subcommittee, accompanying me to discuss the request for the NCUA Central Liquidity Facility are D. Michael Riley, President of the Central Liquidity Facility; Robert M. Fenner, General Counsel; and William Poling, Budget Officer.

For fiscal year 1987 we are requesting a $600 million limit on new loans, which is identical to our requests of the previous 6 years. The expense limitation of $850,000 is also the same we have been presenting in recent years. Last year, the CLF did experience a slight decrease in these limits—the result of a 1.1-percent across-the-board cut in the HUD-Independent Agencies fiscal year 1986 bill, plus a Gramm-Rudman-Hollings cut of 4.3 percent.

Because the CLF by statute deals with unusual or unpredictable events causing liquidity pressures, loan demand from the CLF varies greatly. The fiscal year 1985 outstanding loan balance decreased $47.6 million below the previous year-end but the fiscal year 1984 year-end increased $225 million above fiscal year 1983. Credit unions are currently very liquid due to record share growth. In this situation, demand for the Central Liquidity Facility is minimal. However, this can and has changed very quickly in the past.

We do not see authorization as reason to build up loan volumes to the approved limit, rather, funds will be advanced strictly to support the purposes of the act and in response to circumstances dictated by market events. The relatively low utilization of our total authority can be viewed as a positive sign of credit unions' ability to manage funds, a strong corporate credit union system, and a good economy.

The CLF's role has been and will continue to be the vehicle that is available when unexpected, unusual, or extreme events cause temporary fund shortages. If not handled immediately, these shortages could lead to larger confidence crisis in a credit union or the corporate system. Because of our knowledge of credit unions and immediate access to the supervisory information of NCUA, the CLF exercises a vital role in maintaining member and public confidence in the U.S. credit union financial system.

Lastly, Mr. Chairman, it should be noted that, even though NCUA is self-supporting and receives no tax moneys, we are subject to the Gramm-Rudman-Hollings Act. We do not know precisely the effect of this statute for fiscal year 1987, but it could clearly have a severe adverse impact not only on the CLF, but also on our entire agency.

I will be happy to answer any questions.

BUDGET REQUEST

Senator JEPSEN. Mr. Chairman, I would also like to introduce on my left, the General Counsel, Mr. Robert M. Fenner, and on my immediate right, the President of the Central Liquidity Facility, Mr. Michael Riley, and on my far right, Mr. William Poling, Budget Officer. They will be available to respond to any questions that you may have.

At this time, Mr. Chairman, I would simply say that we are requesting a $600 million limit on new loans, which is identical to our previous request of the past 6 years. The expense limitation of $850,000 is also the same as we have been requesting in recent years. Last year, the CLF did experience a slight decrease in these limits. That was a result of the 1.1-percent across-the-board cut in the HUD-Independent Agencies bill, plus the Gramm-Rudman-Hollings 4.3-percent cut.

It was indicated that because the CLF does deal with unusual or unpredictable events and is the lender of last resort to credit unions, the demand for the CLF varies greatly.

CLF MEMBERSHIP

We have expanded the number of members that are served by the CLF over the years from approximately 4,000 to 17,000. The CLF serves as a very key psychological part of the entire credit union movement. The confidence level is enhanced and strengthened considerably by the very presence of the CLF. We can assure you we intend to use our authorization to reinforce this psychology that has played an important role for us over the years. We do not intend to use this authorization as a reason to build up loan volumes to the approved limit.

GRAMM-RUDMAN-HOLLINGS

I have to close, Mr. Chairman, by saying that even though the NCUA is self-supporting and receives no tax moneys, we are subject to the Gramm-Rudman-Hollings bill. It appears we do not know precisely the effect of the statute for fiscal year 1987, but when you consider that we have approximately 20-percent growth in assets over the last year, and the rapid increase in the number of responsibilities for examinations that our agency has had, we could be very adversely affected.

I would be pleased to comment on that at a different time or whenever it is your pleasure to do so, but we are concerned about Gramm-Rudman-Hollings.

With that, I would just say that I will be happy to answer any questions, and I thank you again for allowing us to appear before you.

FINANCIAL INSTITUTIONS EXEMPTION

Senator GARN. I would say on that point that it makes no sense at all for us to include the Central Liquidity Facility, the FDIC, the FSLIC, or any of those funds that are for the safety and soundness of financial institutions under Gramm-Rudman. In our mindless irresponsibility in Congress, where we simply will not do our job and have not done our job on appropriations bills for so many years that we have to resort to a Gramm-Rudman, I can't really believe that anybody thought this one through, because my colleagues are constantly asking me as chairman of the Senate Banking Committee about safety and soundness. So to include these, I have written letters and will continue to press that say, "These are not taxpayers' dollars."

They have absolutely nothing whatsoever to do with the deficit, and they are coming from members in all the cases of the insurance funds and at a very time when the Senate Banking Committee is holding hearings on how to revise the deposit insurance funds for all the depository institutions in this country and provide for a safer, sounder background in light of the troubled list we have in both the thrifts and the banks, that it makes no sense at all to put arbitrary cuts in these areas that are not taxpayers' funds at all.

But you know that once we do something, however mindless, people don't want to be called mindless or not thinking the problem through, and so rather than just surrender and say, "Hey, that was never intended," they will fight for their positions.

I hope that isn't the case, but it makes no sense at all to include these under Gramm-Rudman when they are for safety and soundness of the financial institutions of this country and are simply not taxpayers' funds at all.

IMPACT OF GRAMM-RUDMAN-HOLLINGS

Assuming that I'm not successful in removing these, what would a 10- to 15-percent Gramm-Rudman reduction in fiscal year 1987 have on you?

Senator JEPSEN. That would have a very serious and adverse effect. We may have to go back to servicing less of the credit unions. I don't know how we would pick and choose. The servicing of credit unions may go back to the original number of 4,000, 5,000; it would be an arbitrary number. But again, it would have a very adverse effect.

Again, the 17,000 members representing 97 percent of all credit unions have access to the Central Liquidity Fund. I can't overemphasize the importance of the psychological effect it has, knowing that we have access to quick funds in the event of emergencies. In fact, on several occasions these funds have been used.

Credit unions have been saved, the members' confidence has been maintained, and it is a key to our members.

So Gramm-Rudman-Hollings would have a very adverse effect.

LENDING LIMIT

Senator GARN. With the expansion of CLF membership and uncertainty over the possibility of liquidity pressures, how confident are you that the $600 million limit on new lending will be adequate through fiscal 1987?

Senator JEPSEN. I am very confident on the basis of some histories and on the basis of where we are with our examination program, that we have put our money where our mouth is in our budgeting, Mr. Chairman. Quality examinations for safety and soundness is something that has taken a top priority in the agency since I have become Chairman.

We have intensified and increased our resources and staff with regard to examination. I believe that quality examinations and working together with the State charter organizations, which we have initiated, we have established some very positive steps toward developing new forms and examination reports. We, hopefully, can avoid having to use this lending as a last resort.

On the basis of past history, it does seem reasonable to believe that this will be sufficient.

I would yield to the Chairman of the CLF and the Chairman of our insurance fund—he wears both hats at the present time—for any further comment he has.

CREDIT UNIONS LIQUIDITY POSITION

Mr. RILEY. Only to say that right now, our liquidity position in credit unions is much better than it was last year at this time. Our share growth is substantial and our loan growth has not stayed on the same path. We are very liquid, and we don't anticipate having to use very much of the $600 million.

PROTRACTED LOANS

Senator GARN. Last year, during the hearing, you listed the amounts of each of your protracted loans and maturity dates. Could you provide for the record your fiscal year 1985 experience as well as your estimates for fiscal year 1986 and fiscal year 1987?

Senator JEPSEN. We will provide that for the record, yes.

[The information follows:]

During fiscal year 1985, because of the trend of interest rates, we paid off all protracted loans and refinanced them on a short-term basis. Thus, we converted 10- and 11-percent loans to 8- or 9-percent loans. The move was beneficial to credit unions as it improved their earnings. The three long-term commitments currently outstanding total $32 milllion and all expire on December 31, 1987—Fort Ord, $10 million; Valley, $2 million; and Mather, $20 million. The three are standby commitments and, at this time, none has been used.

Based on our interest rate forecasts, we will not make any protracted loans in fiscal year 1986. In fiscal year 1987, we estimate protracted credit in the range of $30 to $40 million. There is one unknown which may make it necessary to grant extensive protracted credit and that is the agriculturally related problem credit unions. If conditions worsen, protracted credit may be in the $200 to $300 million range for late fiscal year 1986 and fiscal year 1987.

EXPENSE LIMITATION

Senator GARN. For fiscal year 1987 you are requesting an expense limitation of $850,000. In fiscal year 1986, your expense limitation was $805,000. This is after Gramm-Rudman. It is also an increase over the $766,000 for fiscal year 1985 actual.

What is the purpose of your requested increase in this area?

Senator JEPSEN. I ask Mr. Riley to respond to that.

Mr. RILEY. Part of the increase is a result of the dual role I handled last year, and the understaffing of CLF for the last fiscal year of about two to three people. We will be fully staffed next year, and that accounts for most of the increase that you see.

TRAVEL REQUEST

Senator GARN. Also, in examining the object classification breakout on page 11 of your budget justification, you are going from $6,000 for travel in fiscal year 1985 to an estimate of $34,000 in 1986 and $36,000 in 1987. Could you explain the reason for these relatively large percentage increases in travel?

QUALITY OF EXAMINATIONS

Senator JEPSEN. I would ask Mr. Riley also to respond to this item and say that, Mr. Chairman, as part of our program to increase the quality, improve the quality of examinations, and keep them at an annual level, it is our intention to step up our communications, not only with the credit unions, but with corporates, and the entire credit union family.

In doing so, we intend to have a hands-on relationship, not one of an adverse, heavy-handed regulator, but one of a supervisor, "How can we help," but, nevertheless, one that is continual so that we might be as completely tuned in financially as possible every day.

So we intend to get out and visit credit unions, the corporates, and to talk about working together in a renewed effort to make sure that safety and soundness is paramount. We are heading in the right direction and keeping the right reserves.

Mr. RILEY. Again, the fact that we were understaffed all of fiscal year 1985 and we will be staffing up in fiscal year 1986 results in the change in travel costs next year.

CAPITAL CONTRIBUTIONS

Senator GARN. With your increased growth in assets in fiscal year 1985, what have you done to increase capital contributions of your credit union members and what is your intent on plan for the future in that area?

Senator JEPSEN. The capitalization is kept current with an increase in assets. We have some pictures to provide to you. For example, it is our intention, through good management and constant supervision and planning, to strive to maintain our 1.3 contributed capital ratio, which is the maximum that we can have. It makes for good confidence, and it is the way, in my opinion, to do business. To that end, we intend to work toward that goal.

Mr. Riley, do you have anything to add to that?

Mr. RILEY. In terms of dollars over the last year, we grew by about $190 million in contributions to our credit union contributed capital. We had another $60 million that transferred or converted to Federal insurance from private insurance, so we have grown substantially, and we will continue to grow and adjust these deposit rates annually.

TAX BILL ASSESSMENT ON CREDIT UNIONS

Senator GARN. What is your assessment of the tax bill on credit unions? I am not sure that the Ways and Means or the Finance Committees still understand the voluntary measures that were worked out in exchange for not having $300 million of taxation, that we have put in nearly $1 billion voluntarily.

The threat comes back, again, so I would assume that you need to make that case very strongly, and the members need to make that case very strongly that over $1 billion was placed voluntarily, which does count, against the deficit as opposed to $300 million of taxation. I would assume the position of members would still be very much the same, that if they are going to be taxed, they don't have to keep that voluntary amount there.

Senator JEPSEN. I can assure you, Senator, that the story will continue to be told. As a former Member of the Senate, I am certainly familiar with the philosophy of this administration. You have an organization such as the NCUA that is a self-help and a self-supported organization providing both direction and guidance and work toward investor and consumer confidence and safety and soundness in the financial arena.

As you indicated, in addition, it is sort of a frosting on the cake to see the self-help and self-capitalization by credit unions providing for a Federal deficit reduction rather than taking less in taxes. I don't know how anyone can consider, frankly, changing that situation if they knew the full story.

But I have suggested to members and leaders of the credit union movement across the country to remember Yogi Berra saying, "It ain't over till it's over" and to keep telling the story.

Senator GARN. I have no additional questions for you today, Roger. It is nice to have you before the committee.

Senator JEPSEN. Thank you, Mr. Chairman.

Senator GARN. Thank you very much.

EXECUTIVE OFFICE OF THE PRESIDENT

Office of Science and Technology Policy

STATEMENT OF DR. JOHN P. McTAGUE, ACTING SCIENCE ADVISOR TO THE PRESIDENT AND ACTING DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

ACCOMPANIED BY JERRY D. JENNINGS, EXECUTIVE DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

OPENING REMARKS

Senator Garn. Next we have the Office of Science and Techology Policy.

The Office of Science and Technology Policy was created by the National Science and Technology Policy, Organization and Priorities Act of 1976. The Office was designed to provide advice to the President on scientific and technological considerations in areas of national and international concern and advises the National Security Council.

In addition, the Office provides general leadership and coordination of the research and development programs of the Federal Government and assists the Office of Management and Budget with reviews of proposed budgets for Federal R&D programs.

BUDGET REQUEST

Your budget request for fiscal year 1987 is for $1,167,000, a decrease of $646,000 from the appropriated fiscal year 1986 level.

Dr. McTague, it is a pleasure to welcome you to the hearings. Your predecessor is credited with dramatically changing the role of the Science Advisor and OSTP from one of quiet coordination to highly visible and forceful advocacy. Your prepared statement leads me to believe that you intend to maintain that role.

PREPARED STATEMENT

Your prepared statement will be inserted in the hearing record at this point, after which you may proceed with your oral summation

[The statement follows:]

STATEMENT OF DR. JOHN P. MCTAGUE

Senator Garn and Members of the Subcommittee:

I am pleased to have this opportunity to share my perspectives with the subcommittee as you deliberate the federal agency budgets within your purview, including that of the Office of Science and Technology Policy in the Executive Office of the President. In the coming fiscal year--as in the recent past--science and technology will occupy positions of increasing prominence within the Administration's budget request. For that reason, coupled with the fact that this subcommittee is responsible for a number of the research and development supporting agencies, I would like first to comment on our science and technology policy, to which my agency is inextricably tied--in more than name only.

We are all aware that this is a watershed year for fundamental changes which will affect all segments of our nation for many years to come. Last year the Congress and the President set the stage with the enactment of the Gramm-Rudman-Hollings Act. This enforces a discipline for building one leg of the stool for the long-term strength and prosperity of our country.

Simply stated, Gramm-Rudman-Hollings lays out a schedule to wean us from the addiction of signing our children's names to I.O.U.s for our own pocket money.

Absence of crippling debt is necessary for strength and prosperity, but it is not sufficient. We must also have the military capability to deter any potential aggressor, and the technological and human resources to compete effectively in an increasingly international marketplace.

These are the two remaining legs that the President and the Congress are crafting. The proposed budget for fiscal year 1987 which the President submitted to the Congress sets the priorities for all three legs. It meets the Gramm-Rudman-Hollings target for deficit reduction to 144 billion dollars. This places a severe constraint on the discretionary component of the budget, which itself is only about one-fifth of the total federal budget. That means that, in fiscal year 1987 and beyond, the federal government can fund only those activities that are necessary for it to fund, not those which are merely good and worthy.

The President also has renewed his commitment to research as the third leg, assuring investment in the future. Just last month he stated, and I quote, "Continuing strong support for our nation's science and technology has been and will continue to be a policy of this Administration. The goals of this support are enhanced national security, improved quality of life, and increased international competitiveness. Today, more than ever before, we must use our technological resources aggressively in order to retain international leadership." unquote.

The proposed fiscal year 1987 R&D budget gets us back on an even keel from the formula cuts of fiscal 1986, partially and selectively restoring the trend of real growth experienced in the first half of the 1980s. Because of the long-term nature of research and science and engineering training, and the fragility of research teams, steady, predictable funding is especially important for optimizing future returns on our R&D investment. From 1985 to 1987, basic research obligations are proposed to rise at an annual rate of 1.7 percent in real terms, or approximately one-third of the growth rate experienced in the first half of this decade.

If there is a single characteristic which epitomizes America, it is how we embrace change and pioneering as a way of life. Our parents and grandparents came here to change their lives, and thousands upon thousands still do so today. The Edisons, Wrights, and Fords of an earlier generation used their individual inventiveness to make a reality out of the seemingly impossible, and created whole new classes of industries which underlie the Nation's strength, prosperity, and quality of life.

In the second half of the twentieth century, we more consciously invested in new technology as the output from a continuum of new scientific knowledge and new engineering approaches. The results included military and commerical jet aircraft, lasers, computers, and the enormous field of microelectronics. We strongly benefited from basic research, especially that carried out at our universities, and from the scientists and engineers trained there in a forward-looking research environment.

These lessons have not been lost on the other nations of the industrialized and industrializing world. They too have learned how to systematize technological innovation, and have narrowed dramatically the technological leadership gap. Universally, an increasing fraction of GNP is being invested on research and development, with Japan showing the most dramatic acceleration, as well as showing an increasing concern for basic research, the area which the U.S. clearly has predominated for many decades.

Unless we respond effectively to this challenge, we face a certain loss of technological and economic leadership in the world, with consequences which are not measured in dollars alone. In short, we need a new national science and technology strategy as we begin to approach the twenty-first century. Fortunately, we already have the seeds of that strategy planted across our country. And it does not require a massive infusion of increased federal funding, but rather more effective use of what we have, together with the reasoned, steady increases the President has proposed.

The rapid emergence of modern biotechnology industries in the U.S. provides a lesson worth studying. Here, enlightened federal support of multidisciplinary basic research in molecular biology, both in universities and federal laboratories, led to the revolutionary technology of gene splicing. Close two-way coupling between university researchers and commercial entities fostered rapid transfer of the genetic technology to engineering of specific products and created a whole new, albeit infant, industry in which we have a world lead.

This example teaches several lessons. One is that the most effective federal role is not to attempt to drive specific commercial technologies, but to support forefront basic research, which will have payoffs not foreseeable at the time of funding. The second is that multidisciplinary efforts can be exceptionally effective in advancing our knowledge. The third is that person-to-person, university-industry research relationships can benefit both partners without compromising the academic environment we so cherish.

Modest redirections of our federal R&D investment to encourage these trends, without perturbing the predominately disciplinary structure of our universities, could have high payoff for our nation, so that it will continue to lead the world in creating the next generation of new industries, whatever they may be.

A principal observation of the President's Commission of Industrial Competitiveness, still instructive a year after the publication of its report, was the value of encouraging stronger ties between government, universities, and industry, suggesting that their traditional aloofness was not in the best interest of the nation. The transition from basic science to technology to product is occurring more and more rapidly, and will continue to accelerate in the future. Moreover, it is not a one-way street. Science benefits from technology and its products in comparable measure. Thus, closer relationships more in the spirit of a partnership could be mutually--and nationally--beneficial.

For this reason we are aggressively pursuing an initiative to establish university-based, multidisciplinary, problem-focused, science and technology centers aimed at areas of broad national needs and relevant to industrial technology.

The working model for this sort of arrangement is the National Science Foundation's eminently successful Engineering Research Centers Program, begun in 1985 following an overwhelming response from the academic community. There are now six such centers addressing a wide variety of research areas including robotics, biotechnology, composite materials manufacturing, and intelligent manufacturing systems. Importantly, the funding agreement stipulated that participating universities and industries collaborate in defining the areas of research to pursue, based on mutual needs. In addition to amassing the forces of industrial and academic scientists to solve technological questions with economic implications, these centers provide a highly stimulating research and learning environment--a training ground of unparalleled opportunity for graduate and undergraduate students alike. NSF plans to add more Engineering Research Centers during the current fiscal year, and the FY '87 budget request contains plans for the operation of a total of about 15. This is a good beginning, but only a beginning. This concept deserves emulation across the broad spectrum of interdisciplinary science, mathematics, and engineering. Indeed, DOD has already begun efforts in this direction through its University Research Initiative.

Notably, multidisciplinary, problem-oriented science and techology centers established cooperatively by university and industry on campuses are among the foremost recommendations of the White House Science Council's Panel on the Health of U.S. Colleges and Universities, whose report is due out shortly. Chaired jointly by a leader in high-technology industry, David Packard, and a preeminent university physicist, D. Allan Bromley, this panel urgently stressed the need to enable our colleges and universities to grow commensurate with society's growing demand for the new knowledge and new talent which is their product. This calls for an increased federal investment in higher education and for special attention to the maintenance of modern research facilities and instrumentation on our nation's campuses--a call we intend to heed.

As in the past, support of basic research, particularly in universities, constitutes a major portion of the President's responsible, austere R&D budget for fiscal year 1987, with funding at a proposed level of $8.6 billion. The case for sustained support of academic basic research cannot be overstated. It is a government priority of the highest order; despite the necessity of budgetary constraints, it is an area which we cannot afford to sacrifice.

Conventional wisdom says that the tangible dividends paid by our investment in basic research can be many years distant. In terms of the technological applications that ultimately improve the quality of our lives, ensure our national security, and enhance our industrial capabilities, the transition period is indeed unpredictable and often long. To argue that university basic research does not reap an important, indeed essential product in the short term, however, is to lose sight of the mission of our universities--to educate. There are thousands of "products" generated every year on our nation's campuses. The assembly line is a procession of young people in cap and gown marching to receive degrees and going out into the nation's work force armed with the knowledge and experience gained in the classrooms and laboratories of our colleges and universities. The consumer is industry, which relies today more than at any time in the past on the individual skills of well-educated graduates. Without question, federally-supported university research does have a short-term impact on America's industrial competitiveness, and that impact is people. Indeed, in excess of sixty thousand scientists and engineers receive financial support for their education each year from federal research dollars.

The same report of the President's Commission on Industrial Competitiveness emphasized that in the international industrial arena, the United States enjoys only two advantages over our competitors: our technology and our talent. Talent is the immediate, short-term return on the federal government's investment in basic research. If you accept the premise that America's leadership depends upon her scientific and technological preeminence, then you must commit yourselves to maintain the talent base which fuels our science and technology enterprise, and that requires a continued, unswerving commitment to academic excellence, manifest in the support of quality basic research in our universities.

The National Science Foundation, the flagship civilian supporter of academic basic research, plans three special thrusts for FY '87. In the realm of biotechnology--burgeoning with possible applications--centers, mini-centers, and individual awards will be funded at a level of over $100 million. An additional $27 million will supplement the existing base of $57 million in computational science and engineering to establish new interdisciplinary teams, enhance existing centers, and support equipment and training. A proposal to more than double the FY '86 funding level for global geosciences emphasizes interrelated research efforts treating the earth as an integrated system of physical, chemical, and biological processes.

NSF support is particularly important because it complements the basic research programs of other agencies and assists in balancing federal support for promising research across all fields of science and engineering. In addition to its primary role of supporting basic research at colleges and universities through individual project grants, NSF will strive also to provide educational opportunities for future scientists and engineers, with increased emphasis on undergraduate research and education and on research facilities and instrumentation. We simply must attract and retain a larger fraction of our most talented youth in both undergraduate science and engineering programs.

Science is never static, and the United States no longer enjoys the luxury of setting the pace at which developments progress. Perhaps the most heartening aspect of the proposed FY '87 R&D budget is the fact that fiscal restraint does not prevent supporting high-priority new starts across the R&D-supporting agencies. It will enable the Department of Energy to undertake two construction projects, the Continuous Electron Beam Accelerator Facility at Newport News, Virginia, and the 1-2GeV Synchrotron light source at Lawrence Berkeley Laboratory, while also expanding the use of existing accelerator facilities. The Tevatron I proton-antiproton colliding beam facility, recently completed at Fermilab, and the Stanford Linear Collider, are scheduled to begin operation, regaining U.S. leadership in this most fundamental of experimental sciences at a time when discovery is occurring at a breakneck pace.

Approximately $200 million is requested for a joint NASA-DOD project to develop and demonstrate the technologies for a revolutionary class of aerospace plane with the capability to take off from and land horizontally on a standard runway, cruise in the atmosphere at speeds of up to twenty-five times the speed of sound, or fly into low earth orbit. In addition to anticipated benefits in the areas of defense and space activities, the technologies behind this trans-atmospheric vehicle could lead to a civilian transport aircraft capable of traveling to any point on the globe within three hours.

NASA plans also to initiate a major new flight project, undertaken jointly with France. The Ocean Topography Experiment (TOPEX), a further development in the study of oceanography from space, will measure the surface landscape of the oceans over a period of three years to further the understanding of the oceans' general circulation patterns. In addition, NASA will begin instrument development for the International Solar-Terrestrial Physics (ISTP) Program. To be planned and executed in conjunction with the European Space Agency and Japan, ISTP is intended to provide a comprehensive effort to measure phenomena associated with the sun-earth interaction chain.

In formulating these plans for the future, we have heeded the advice of several distinguished panels, including the Seitz-Eastman Panel on Large Facilities for Materials Science, which guided the the development of the 1-2 GeV synchrotron light source; the Aeronautical Policy Review Committee, whose recommended national aeronautical research and development goals included pursuit of the aerospace plane; the Space Science Board reports, which urged further space-based oceanographic studies; and the Nuclear Sciences Advisory Committee, which influenced the construction of the Continuous Electron Beam Accelerator Facility.

But not all recommendations deal with facilities. The Pimentel Panel on Opportunities in Chemistry reported on several high-leverage areas, such as chemical instrumentation, maintenance and operation, as well as thrusts in the chemistry of life processes and in chemical catalysis. As a result, the FY '87 NSF request for chemistry has a 15 percent increase in chemistry funding over FY '86, not including the Gramm-Rudman-Hollings recission.

A few years ago, the David Panel reported on the inadequacy of funding for mathematics, as distinguished from computer, research. Over the past two years, we have increased mathematics funding in NSF and DOD by almost 20 percent in real terms.

Again, these responses to valuable advice have been made not because it is good for science, or even because it is good for the nation, but because it is necessary for the nation.

I would like to conclude by saying a few words about the Office of Science and Technology Policy. It is all well and good to invoke the organic legislation and talk about the office's broad-ranging analytical and advisory responsibilities to the President, our routine collaborative efforts with the Office of Management and Budget to plan and coordinate the federal government's R&D activities, to offer advice and counsel on matters of science and technology to the National Security Council and other agencies of the Executive Office of the President and the Executive Branch, and to act as the Administration's spokesman to Congress on scientific and technological issues, but that doesn't tell the whole story.

A consequence of the diversity of our functions, in my view, is that the full scope of our work is rarely perceived. You see the bits and pieces: the White House Science Council issues a report on federal laboratories, the Cabinet Council Working Group on Biotechnology, chaired by OSTP, publishes guidelines for the federal regulation of biotechnology products and you discover we're striving to evolve a coherent regulatory framework for the federal government's role in biotechnology; another report on chemical carcinogens appears in the Federal Register, bringing overnight, national attention to three years of quiet work. OSTP is a little like an impressionist painting; if you don't stand back, you miss the picture. All you see are the tiny dots of color. It's an ironic dilemma, in light of the fact that it is precisely our mission to see the thing whole.

It is a truism that science and technology are pervasive in our country and, increasingly, in the world. We are all aware that our national security and our economic competitiveness rely heavily on our technological edge. Almost all advanced nations around the globe have responded to the importance of science and technology in government policies and activities by establishing a Ministry of Science and Technology, or its equivalent. Our more decentralized system of government has, characteristically, responded more diffusely. Line authority for S&T efforts is distributed among a large number of departments and agencies. Many of these efforts overlap, so some high-level focus for coordination is needed.

Let me illustrate by an example, materials research. Major materials programs exist in DOD, DOE, NASA, NSF, DOI, and NBS, and several other agencies have smaller efforts. The Interagency Committee on Materials (COMAT), which I chair, coordinates these efforts to ensure that they complement each other and that they, in sum, address all the Federal Government's needs in the field. COMAT also coordinates closely with academe and industry. COMAT is one of a dozen committees reporting to the Federal Coordinating Council on Science, Engineering and Technology (FCCSET), the other being Atmosphere and Oceans; Federal Laboratories; Food, Agriculture, and Forestry Research; Human Subjects; Intellectual Property; Ocean Pollution; Radiation Policy; Solar-Terrestrial Research; Supercomputers; and the newly-established Committee on International Science, Engineering and Technology and the Biotechnology Science Coordinating Committee.

Notably, the FCCSET was mandated by Congress specifically to provide a forum for coordination and communication among the heads of R&D-supporting agencies and focusing on significant national and international scientific and technological issues cutting across areas of shared responsibility. In other words, it is one means of avoiding the kind of costlly, unproductive duplication of effort which the federal government can least afford in the current climate of deficit reduction. In the technology-intensive contemporary world, with federal R&D budgets and activities growing in strength and numbers, the need for such coordination is increasing, not decreasing.

A summary of OSTP's accomplishments during fiscal year 1985 has been submitted for the record, so I won't reiterate the contents of that self-aggrandizing document. However, during the past year our responsiblities have grown to encompass areas of emerging importance and concern worthy of mention here.

International science and technology is more significant today because most countries recognize that a strong and vital science and technology enterprise is essential to economic growth, long-term prosperity, and national security interests. Because the United States is widely perceived as the world leader in science and technology, many countries are targeting science and technology cooperation as a top priority in their bilateral relationships with the U.S. OSTP has taken the initiative to utilize our nation's scientific and technological capabilites and resources as a powerful foreign policy tool to strengthen our close partnership with our advanced allies, influence our expanding relationships with developing countries, and underscore the changing political climate and competition with our adversaries.

Last October, at the instigation of the OSTP Director, the Canadian Minister of Science and Technology convened an informal gathering of science ministers from the U.S., West Germany, the United Kingdom, Italy, Japan, and Australia. Designed to bring together top science policy officials from nations with similar societies to discuss common experiences and problems related to the application of science and technology to their economies. The participants agreed that the personal contacts established and discussions that ensued were useful. Many expressed an interest in organizing similar meetings in the future.

Science and technology highlighted the agenda of Indian Prime Minister Rajiv Gandhi's June visit to the U.S., during which he and the President renewed for an additional three years the Presidential Science and Technology Initiative (STI). OSTP formulated the STI concept in 1982, drawing on the expertise of a blue ribbon panel of eminent scientists, and continues to provide policy guidance and management oversight for its ongoing operation through the National Science Foundation, which serves the STI as Executive Agent and reports directly to OSTP. Designed to concentrate joint research programs on a few selected priority areas in which the complementary talents and shared resources of both research teams would produce tangible research results of benefit to both countries, the first phase of STI work in the health and agriculture areas has been particularly successful. The STI approach has become a model for U.S. S&T collaboration with developing countries, like India and Brazil, who have achieved a measurable level of scientific accomplishment and are potential competitors in the world economy. The principal U.S. players are our preeminent technical agencies and university research community. Importantly, political commitment at the Head of State level and shared financial investment in STI activities make the initiative a joint venture among partners, not a donor program tailored to a recipient country's basic needs. The investment partnership concept delivers shared scientific benefits while at the same time forging closer bilateral relationships between the U.S., our emerging competitors, and potential allies.

The rapid expansion of our international activities lead to the formation, last December, of a FCCSET Committee on International Science, Engineering and Technology to bring senior-level interagency expertise to bear on international S&T issues, to better integrate U.S. international S&T activities into the framework of domestic R&D policies, and to ensure consistent priorities and budgets--clearly more than any one agency could undertake alone.

OSTP played a key role in the formulation of the National Space Strategy, and was a major participant in the establishment of a National Commission on Space to identify goals, opportunities, and policy options for U.S. civilian space activities for the next twenty years. We were instrumental in laying the framework within which the Commission would work and had a central role in nominating Commission members, and serve as Executive Branch liaison to the Commission.

Perhaps our most challenging coordination effort has been in the complex and expanding field of biotechnology. Acknowledging that all the regulatory agencies are highly dependent on new and rapidly changing knowledge, and that much of this knowledge is commonly appropriate to all the agencies, a FCCSET Biotechnology Science Coordinating Committee was established last fall to ensure that all regulatory agencies will use sound scientific bases for their biotechnology policies. Concurrently, the Domestic Policy Council Working Group on biotechnology, chaired by OSTP, is devising a regulatory scheme that would provide industry and the research community with an efficient and sensible means for approval of their products and research proposals. Shortly it will publish policy statements describing how OSHA, EPA, USDA, FDA, NIH, and NSF review and approve processes, products, and research projects.

These examples illustrate not only the breadth of OSTP's coordination responsibilities, but also our responsiveness to emerging technologies, opportunities, and problems. Equally important, and equally obscure, are our day-to-day obligations to the nation. Few are aware that OSTP is a principal agency involved in the development and implementation of telecommunications policy for crises or emergencies. The Director of OSTP is responsible for the provision of information, advice, guidance, and assistance to the President for the management and allocation of telecommunications resources in the event of a national emergency. We are also deeply involved in a variety of critical activities associated with emergency preparedness planning and continuation of government functions. While each of us devoutly hopes never to have to mobilize them, these activities are demanding, pervasive and absolutely essential to national security.

The present era of austerity in the federal government requires that we all tighten our belts. Can OSTP function effectively with less funding and staff than it has had over the past decade? Yes, it can, and I believe that it can even do a better job with less. Can it do all that is required of the office with the budget as submitted? No, it cannot.

STATEMENT HIGHLIGHTED

Mr. McTAGUE. Thank you, Senator.

We are all aware that this is a watershed year for fundamental changes which will affect all segments of our Nation for many years to come. Last year the Congress and the President set the stage with the enactment of the Gramm-Rudman-Hollings Act. This enforces a discipline for building one leg of the stool for the long-term strength and properity of your country.

Absence of crippling debt is necessary for strength and prosperity, but it is not sufficient. We must also have the military capability to deter any potential aggressor and the technological and human resources to compete effectively in an increasingly international marketplace.

These are the two remaining legs that the President and the Congress are now crafting. The proposed budget for fiscal year 1987 which the President submitted to the Congress sets the priorities for all three legs. It meets the Gramm-Rudman-Hollings target for deficit reduction to $144 billion. This places a severe constraint on the discretionary component of the budget. That means that, in fiscal year 1987 and beyond, the Federal Government can fund only those activities that are necessary for it to fund, not those which are merely good and worthy.

The President also has renewed his commitment to research as the third leg, assuring investment in the future. Just last month he stated:

> Continuing strong support for our Nation's science and technology has been and will continue to be a policy of this administration. The goals of this support are enhanced national security, improved quality of life, and increased international competitiveness. Today, more than ever before, we must use our technological resources aggressively in order to retain international leadership.

R&D BUDGET

The proposed fiscal year 1987 R&D budget gets us back on an even keel from the formula cuts of fiscal year 1986, partially and selectively restoring the trend of real growth experienced at the first half of the 1980's. From 1985 to 1987, basic research obligations are proposed to rise at an annual rate of 1.7 percent in real terms, or approximately one-third of the growth rate experienced in the first half of this decade.

As in the past, support of basic research, particularly in universities, constitutes a significant portion of the President's responsible, austere R&D budget for fiscal year 1987, with funding at a proposed level of $8.6 billion.

I would like to conclude by saying a few words about the Office of Science and Technology Policy. It is all well and good to invoke the organic legislation and talk about the Offices' broad ranging analytical and advisory responsibilities to the President, our routine collaborative efforts with OMB to plan and coordinate the Federal Government's R&D activities, to offer advice and counsel on matters of science and technology to the National Security Council and other agencies of the Executive Office of the President and the executive branch, and to act as the administration's chief spokesman to Congress on scientific and technological issues, but that doesn't tell the whole story.

A consequence of the diversity of our functions, in my view, is that the full scope of our work is rarely perceived. OSTP is a little like an impressionist painting; if you don't stand back, you miss the picture. All you see are the tiny dots of color.

Almost all advanced nations around the world have responded to the importance of science and technology in Government policies and activities by establishing a ministry of science and technology, or its equivalent. Our more decentralized system of government has, characteristically, responded more diffusely. Line authority for S&T efforts is distributed among a large number of departments and agencies. Many of these efforts overlap, so some high-level focus for coordination is needed.

Let me illustrate by an example, materials research. Major materials programs exist at DOD, DOE, NASA, NSF, the Department of Interior, and NBS, and several other agencies have smaller efforts. These efforts are coordinated by the Interagency Committee on Materials [COMAT], which I chair. COMAT is only one of a dozen committees reporting to the Federal Coordinating Council on Science, Engineering, and Technology, known as FCCSET. FCCSET is a congressionally mandated body set up deliberately to coordinate such efforts.

Committees reporting to FCCSET, which reports to the Director of OSTP, include: Atmosphere and Oceans; Federal Laboratories; Food, Agriculture, and Forestry Research; Human Subjects; Intellectual Property; Ocean Pollution; Radiation Policy; Solar Terrestrial Research; Supercomputers, and the newly established Committee on International Science, Engineering and Technology, as well as the Biotechnology Science Coordinating Committee.

THE OSTP ROLE

During the past year our responsibilities have grown to encompass areas of emerging importance and concern, including areas involving international collaboration in science, which caused us to set up, last December, the FCCSET Committee on International Science, Engineering, and Technology.

OSTP has also played a key role in the formulation of the national space strategy, and was a major participant in the establishment of a National Commission on Space to identify goals, opportunities, and policy options for U.S. civilian space activities for the next 20 years. From the outset, we have been actively involved in the interagency effort to determine the consequences of the tragic loss of the Space Shuttle Challenger. Together we will proceed systematically to evaluate the alternatives. At the proper time, we will move ahead with a safe, effective plan of action.

Perhaps our most challenging coordination effort has been in the complex and expanding field of biotechnology where we chair several committees coordinating OSHA, EPA, USDA, FDA, NIH, and NSF.

These examples illustrate not only the breadth of OSTP's coordination responsibilities, but also our responsiveness to emerging technologies, opportunities, and problems. Equally important, and equally unpublicized, are our day-to-day obligations to the Nation. Few are aware that OSTP is a principal agency involved in the development and implementation of telecommunications policy for crises or emergencies. The Director of OSTP is responsible for the provision of information, advice, guidance and assistance to the President for the management and allocation of telecommunications resources in the event of a national emergency. We are also deeply involved in a variety of critical activities associated with emergency preparedness planning and continuation of Government functions. While each of us devoutly hopes never to have to mobilize them, these activities are demanding, pervasive, and absolutely essential to national security.

The present era of austerity in the Federal Government requires that we all tighten our belts. Can OSTP function effectively with less funding and staff than it has had over the past decade? Yes, it can, and I believe that it can do even better with less. Can it successfully carry out all that is presently required of the Office with the proposed budget? No, it cannot. Extremely difficult choices will have to be made.

Senator GARN. Senator D'Amato, do you have a statement you wish to make?

Senator D'AMATO. Yes, Mr. Chairman, I have a statement that I would like to submit for the record, and if it meets with your approval, I have several questions I would like to submit in writing, so as not to take the time of the committee.

PREPARED STATEMENT AND SUBMITTED QUESTIONS

Senator GARN. We would be happy to put your statement in the record and also submit questions for your response in writing.

Senator D'AMATO. Thank you, Mr. Chairman.

[The statement and questions and answers follow:]

STATEMENT OF SENATOR ALFONSE D'AMATO

Mr. Chairman, I am pleased to join you for this hearing on the President's fiscal year 1987 budget for the Office of Science and Technology, National Credit Union Administration, and the Department of Treasury: Office of Revenue Sharing.

The Office of Science and Technology Policy [OSTP] serves in a very unique capacity for the President and other organizations within the Executive Office of the President. Coordination and policy assessment of the research and development programs of the Federal Government is a formidable task undertaken by OSTP.

It is essential that we continue to heighten public awareness and commitment to advanced scientific technologies to make this country stronger and more prosperous. The collaborative effort of agencies of the Federal Government focusing on research and development can certainly make a difference in our scientific advancement. Activities of OSTP have facilitated the accomplishment made in the United States toward science and technology advancement. In the years to come, it will become ever more important that we have agencies that continue to increase the contributions of science and technology to the national goal of improved industrial competitiveness. Increased collaboration among agencies will help us attain this goal.

At the request of Dr. Keyworth, and under the cochairmanship of Mr. David Packard and Dr. Allan Bromley, the White House Council embarked upon a study examining the general well being of our Nation's universities. This study focuses on the competitive position of our universities, the retention and attraction of the most qualified in research and instruction in science, engineering, and medicine. This report, monitored by OSTP, promises critical information for the continued advancement of science and technology in our academic institutions. I look forward to seeing this report and its recommendations for change.

If we are to maintain a competitive edge in the sciences, it is vitally important that we not only focus attention on our universities, but on our children as well. They must develop unparalleled expertise in the sciences. This has been one of the main objectives of this administration. Our agencies should be focusing attention on developing initiatives for the further development of precollege science and mathematics education. I look forward to hearing more from OSTP and other Federal agencies concerning initiatives for fiscal year 1987 to address this concern.

The National Credit Union Administration provides a valuable service to credit union members. The NCUA regulates credit unions, provides liquidity assistance to member credit unions, and insures depositor's accounts. In 1985, the equity national credit union share insurance fund climbed from $286 million in 1984 to $1.1 billion. I look forward to hearing more from the NCUA concerning the fiscal year 1987 budget.

The Office of Revenue Sharing was established to implement the State and Local Fiscal Assistance Act of 1972. It was responsible for computing and distributing revenue payments to recipient governments.

The administration, however, is not seeking to reauthorize the Revenue Sharing Act upon its expiration at the end of 1986. I strongly disapprove of this budget recommendation. I believe that general revenue sharing is vital to the efforts of localities, both big and small, to provide essential services to their citizens. General revenue sharing is used to hire teachers, to repair bridges, to plow snow, to feed senior citizens, and to employ police officers and firefighters. It is vital to our communities.

I am interested in hearing from the Office of Revenue Sharing. Any comments or suggestions on alternatives to the planned elimination would be appreciated greatly.

Mr. Chairman, I have a few questions that I would like answered concerning the Office of Science and Technology Policy, the National Credit Union Administration, and the Office of Revenue Sharing. I will submit them for the record.

QUESTIONS SUBMITTED BY SENATOR D'AMATO

NATION'S UNIVERSITIES

Question: I understand that at the request of Dr. Keyworth and under the co-chairmanship of Mr. David Packard and Dr. Allan Bromley, the White House Council embarked upon a study examining the general well being of our Nation's universities. This study focused on the competitive position of our Nation's universities, the retention and attraction of the most qualified in research and instruction in science, engineering and medicine. Although the report is to be released during the Spring of this year (1986), could you give us a preliminary report of your findings?

Answer: Yes. The following information is from the Executive Summary of the draft report, "A Renewal Partnership", prepared by the White House Science Council Panel on the Health of U.S. Universities and Colleges.

I. EXECUTIVE SUMMARY

The health of U.S. society is uniquely coupled to that of its universities. To a greater degree than any other country this Nation looks to its universities both for new knowledge and for young trained minds prepared to use it effectively. But just at a time when much is expected of our universities, after more than a decade of retrenchment and belt tightening, they find themselves with obsolete equipment, aging facilities, and growing shortages of both faculty members and students in many important fields.

In response to a request from former Science Advisor to the President, George A. Keyworth, for recommendations on how to ensure the universities' long-term ability to provide the talent and research necessary for the Nation's scientific enterprise, the White House Science Council established the Panel on the Health of U.S. Colleges and Universities. Its membership includes representatives from the research community, both academic and nonacademic. This report is the result of their study.

To assess university system's future, the Panel asked -- among others -- the following questions: Are our universities attracting the best students into science and engineering? Is the education and training provided adequate to prepare the next generation of scientists and engineers for the challenges of the 21st century? Will our universities be able to respond appropriately as these demands change? Is the environment and support appropriate so as to allow researchers to be optimally productive?

The answers to these questions cause us concern. The problems are real and ubiquitous.

We are cetainly not alone in recognizing that science and technology are critical to our future. Nations everywhere are investing in these capabilities. We conclude that we must rethink and, in many ways, rebuild the critically important interactions between universities, government, and industry that have served this

Nation so well in the past. The federal government-university relationship is too fundamental to the maintenance of our national science and technology base to be taken for granted, and the industry-university partnership is emerging as critical to exploiting that base in order to compete in the world marketplace.

One conclusion is clear: our universities today simply cannot respond to society's expectations for them or discharge their national responsiblities in research and education without substantially increased support. Federal support of university research as a percentage of the gross national products peaked in 1968 and reached a low point in 1978. After increases in 1979 and 1980, it has declined in the 1980's (Figure 1). In 1984, only $8 billion of the nearly $100 billion in total national research and development was performed in universities, a level that simply does not reflect our dependence on the availability of the most able technical talent. An economy whose growth prospects depend upon maintaining a competitive edge in technology must look to an increasing -- not decreasing -- emphasis on the source of this technical talent. It is time to take an honest look at what the real costs of university-based research are and how they should be borne. We must return to the view point that federal support of such research is a long-term investment in the Nation's future rather than the procurement of a necessary product.

The strength of the nation in trade, defense, and health has been directly related to past investments in science and technology. Our future position in global markets will similarly depend on our willingness to respond to opportunity and to mobilize our strengths today. To this end, we must promote a broad interdisciplinary approach to problem-solving by focusing on university-based centers that will improve cooperative linkages between scientists, engineers, and industry.

If we are to have an acceptable future in an increasingly technological and competitive world, and if we are to respond adequately to national needs in areas of economic competitiveness, national security, and quality of life for all our citizens, the time has come when a new partnership involving all three, the Federal Government, universities and the private sector, must be forged. And we must be realistic about the very real limitations on the extent to which industrial support of basic research, important as it is, can replace that from the Federal Government.

In the summary which follows, we present the Panel's major findings and recommendaions. We believe that they demand the attention of the nation, and that if they are implemented, our universities will respond enthusiastically and effectively. Our present leadership in international science and technology is challenged; indeed, many consider it fragile and endangered. We are confident that the actions we recommend will allow us to retain this leadership. We cannot afford less.

FINDINGS

-- A healthy university system is the basis for our future. In any ranking of priorities for allocating R&D support -- both federal and private -- universities must rank first.

-- Demands for new talent and new knowledge have never been greater. Universities will not be able to respond to these growing needs without increased federal support. In particular, we encourage continuation of present administration policies to further increase basic research as a fraction of total national R&D funding.

-- Of equal importance with the level of funding is the stabilization of federal support to permit more effective use of financial and human resources. The most ambitious research requires long lead times for preparation and incubation. Research groups are exceedingly fragile; once disbanded, they can rarely be reassembled. In the absence of stability and predictability, important opportunities have been lost, scarce resources have been used inefficiently and, most serious, some of the brightest young minds in each recent generation have been lost to science and technology.

-- The universities themselves must share the responsibility for the deterioration of their health and capability. In attempting to ride out what were hoped to be temporary budget shortfalls, they mortagaged their research personnel rather than investing in needed instrumentation or facilities. Moreover, research faculty members have themselves too often forgone high risk exploratory research which, were it to succeed, could have impressive payoff.

-- State and local governments as well as private philanthropy, play a vital role. Their initial investments develop the structures and programs that make universities competitive for federal investment, and they provide resources by which academic institutions preserve their autonomy and diversity. More, such support is a major element of the shared responsibility that typifies the present university-Federal Government partnership.

-- The diversity of our college and university system is an essential element of its strength.

-- In recognition of the leadership demands that our society will place upon them, it is essential that mechanisms be developed for early identification and support of our most able youth.

-- Strong university-government-industry partnerships are fundamental to meeting our goals in economic competitiveness, national security, agriculture, health, and in improving the quality of life of our citizens.

RECOMMENDATIONS

A. To maintain the strong science base essential to our national future, we recommend that:

1. The Federal Government make substantially greater investments in our centers of learning in the 1980's and 1990's than in the 1970's. The recommendations set forth in this report, if they are to be implemented fully, require significant increases in financial support. The source of

such funding in these times of fiscal stringency is not obvious. Reallocation of R&D appropriations appears to be the most probable source, but we believe that incremental new funding will be required. In any case, we emphasize that this federal investment, at minimum, must keep pace with the overall national investment in R&D; at the current rate of growth it will double in ten years. More rapid growth is essential if our universities are to meet the burgeoning demands being made upon them from almost every sector of our society. The Federal Government is the only practical source of funding for the major part of this growth.

2. The Federal Government support a major initiative to establish university based interdisciplinary, problem-oriented research and technology centers directed to problems of broad national needs and relevant to industrial technology.

3. The Federal Government bear its full share of the cost of the university research it supports.

B. To build a solid partnership among the Federal Government, industry, and universities; to enable the university infrastructures to keep pace with research and educational needs; and to assure that the universities are able to pursue research and education effectively, we recommend that:

1. Federal policies recognize that the cost of university research facilities and equipment are a necessary part of federally sponsored, university-based research costs.

2. The portion of federal research grants and contracts that reimburse universities for use or depreciation of facilities and equipment (use allowances) be based on realistic useful lifetimes:

   a. Useful life of buildings and facilities should be reduced from the present level of 50 years to 20 years.

   b. Useful life of equipment and instrumentation should be reducted from the present level of 15 years to 5 to 10 years, depending on the class of equipment.

   These changes, which do no more than inject reality into the costs of doing research, will increase substantially the indirect fraction of total costs. This increase should not be drawn from direct research costs but from reallocation of funds from other sources.

3. To allow U.S. universities to restore their infrastructures in a timely fashion, a facilities fund be established within NSF for each of the next ten years. And that in order to encourage excellence:

   a. All proposals submitted to this facilities fund should be subjected to peer review within the scientific or technological community involved, and

b. All awards from the fund should be made on a 50/50 matching basis with non-federal funding.

4. Any reorganization of the federal tax code recognize the importance of increased industry-university interaction. A 25% nonincremental tax credit should be established for industrial funding of university research and for industry-supported maintenance and servicing of university equipment. A tax deduction equal to the full market value of all industrially contributed equipment should be established.

C. To minimize controversy and friction concerning the reimbursement of indirect costs, we recommend that:

1. Reimbursements for administrative costs within the indirect cost category be fixed at a uniform percentage of modified total direct costs. That percentage should be the mean national percentage over a five-year historical period, and the adjustments should be phased in over a two-year period to allow those universities now charging more than the new fixed rate to plan for reduction. This change will eliminate much of the need for faculty effort reporting.

2. The formal requirement for cost-sharing be eliminated.

3. The paperwork burden associated with grant and contract administration be reduced to a minimum. In the Panel's view, all faculty effort reporting should be eliminated.

4. All federal agencies supporting university research adopt the NSF practice of including the indirect costs in the project budget subject to peer review.

D. In order that the university environment be conducive to high-quality research and education; that it be attractive to the best minds; and to increase the effectiveness with which federal funding is used for research, we recommend that:

1. Federal agencies work toward an average grant or contract duration of at least three, and preferably five, years.

2. Investigators be free to use up to 10% of their grant or contract support on a fully discretionary basis and be permitted to carry unexpended funds forward from one fiscal year to the next.

3. Federal agencies make greater use of block grants or contracts to support groups of investigators having shared research interests.

4. For greater flexibility, to facilitate changes in an investigator's field of research, and to support high-risk research, federal agencies, except in the cases of

young investigators, place substantially more emphasis upon the research history of the investigator and less on the proposed research project in making awards.

E. To identify and educate our most talented youth more effectively, and to enable experienced scientists and engineers to continue to contribute their skills in a changing technological environment, we recommend that:

1. A substantial program of merit-based, portable scholarships be established by the federal government at the undergraduate level. Parallel programs should be established by industries having significant dependence upon university research and education. The national goal should be for the most able 1% of the undergraduate students in mathematics, engineering, and the natural sciences entering colleges or universities each year to be supported under these programs. This program is recommended as an additional to, not a substitution for, existing need-based federal assistance programs.

2. Substantial programs of multiyear merit-based fellowships, both federal and industrial, be established in science, mathematics, and engineering at the graduate level. Reflecting national needs, the field distribution of these fellowships would be expected to change over time.

3. Universities encourage interdisciplinary activities at the graduate level while retaining the essential quality control function now played by the traditional disciplinary departments.

4. Industries and universities develop attractive continuing education programs for engineers and scientists that are matched to contemporary industrial requirements and to modern science and technology.

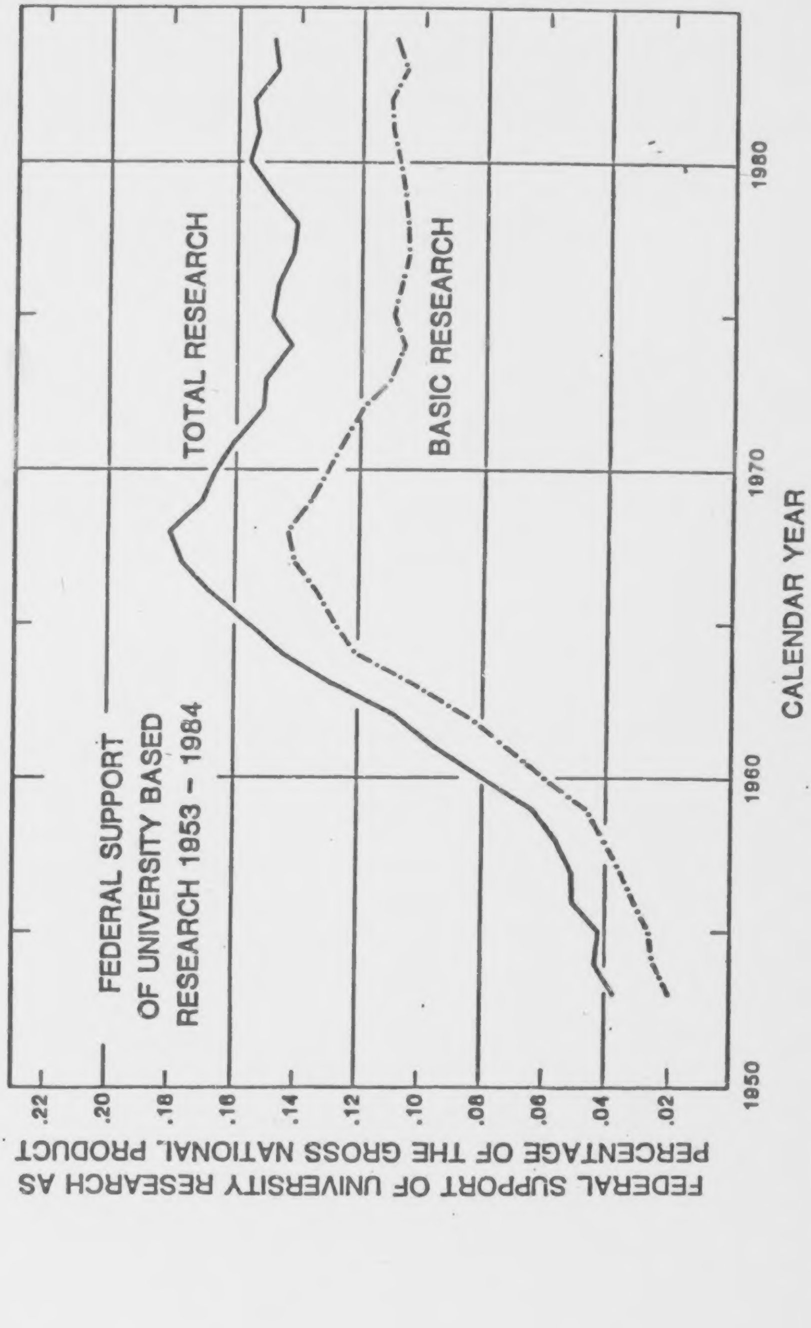

FEDERAL SUPPORT
OF UNIVERSITY BASED
RESEARCH 1953 - 1984
TOTAL RESEARCH
BASIC RESEARCH
FEDERAL SUPPORT OF UNIVERSITY RESEARCH AS
PERCENTAGE OF THE GROSS NATIONAL PRODUCT
.22
.20
.18
.16
.14
.12
.10
.08
.06
.04
.02
1950
1960
1970
1980
CALENDAR YEAR

Figure 1

PRECOLLEGE SCIENCE AND MATHEMATICS EDUCATION

Question: The National Science Foundation has been focusing on precollege science and mathematics education. What collaborative efforts, if any, are being undertaken by other Federal agencies in promoting the further development of precollege science and mathematics education?

Answer: Department of Energy

1. The Pre-freshman Engineering Program (PREP) which is specifically aimed at increasing the role of women and minorities in science and technology, brings 2,500 precollege students to the national laboratories for six week summer programs.

2. A high school summer program for nominated students from each governor brings 52 math students to Lawrence Livermore National Laboratory for hands-on use of the supercomputer for two weeks, and 52 science students to the National Synchrotron Light Source for experience on this research tool for two weeks. In 1987 there are plans to establish a similar program at Lawrence Berkeley Laboratory with the Materials Research Lab.

e. Argonne, Berkeley, and Brookhaven bring 10 high school teachers per lab to work on research projects for the summer. Significant industrial cost sharing is involved. The teachers also design laboratory experiments for their classrooms and a physics text has come from the program.

4. The Department of Energy also supports the international science fair nationwide. Of the final 2,000 projects, the 10 which are judged to best address energy problems were invited with the students and teachers to visit Lawrence Livermore National Laboratory in 1985 and Oak Ridge National Laboratory in 1986 for one week. All expenses paid.

National Aeronautics and Space Administration

1. A new national science teachers program honors 25 high school teachers by paying expenses for a two week visit to the National Aeronautics and Space Administration facilities in the summer. The participants are selected by the National Science Teachers Association.

2. Schools are supported through the provision of an Education Publication Program for Teachers consisting of curriculum materials and supplements. A quarterly publication is also sent to 55,000 teachers nationwide.

3. Conferences are sponsored by the National Aeronautics and Space Administration two days prior to each major event (e.g., a launch) for high school teachers.

4. An aeronauticsmobile tours the country providing general aviation information to schools.

5. The National Aeronautics and Space Administration supports two lecture series on aeronautics and space sciences. Three persons

are on contract to tour the country.

6. The National Aeronautics and Space Administration has "adopted" 20 schools where they work with teachers and provide materials and computers.

7. The Long Duration Exposure Facilty program is awaiting the return of millions of tomato seeds for elementary school students.

8. A teachers in space program will continue in order to raise the recognition of the teaching profession and to promote research in space. Eight finalists are under contract for one year working at the National Aeronautics and Space Administration centers. Barbara Morgan will soon join the National Aeronautics and Space Administration headquarters to promote the program locally.

9. A space ambassador's program has involved 114 finalists (two from each state) to provide lectures in their region.

10. Operational Liftoff provides elementary materials, curriculum and teacher resource rooms at the National Aeronautics and Space Administration centers. Videotapes, slides and publications may be duplicated by request of teachers.

Department of Defense

1. In 1980 the Department of Defense began a science and engineering apprentice program for high school students. The program opens the 73 Department of Defense laboratories for eight weeks in the summer for one-on-one mentor research. To date, 5,000 students have been through the program. At Naval Research Laboratory alone 100 students will spend the summer this year. Dr. Carley, the latest Nobel Prize Winner in Chemistry, served as a mentor in the program and now his daughter has students. A strong component is on recruitment of minority and female scientists.

2. The Army Research office arranges for high school students to work with its university research contractors in summers under the Research Engineering Apprentice Program.

3. The Department of Defense supports the National Science and Engineering Fair by providing judges and scholarships for winners. The top math student's are invited to participate (with paid expenses) in the international math Olympiad for a fortnight in London.

4. A pilot program sponsored by the Army brings very bright high school students to the University of North Carolina for 6-8 weeks of computer training.

5. A high school teachers pilot program brought 100 teachers of physics and chemistry (with industry assistance) to the Department of Defense laboratories for summer work. Their philosophy: "Why have teachers paint in the summer? Let's make research in their profession available to them."

SCIENCE KNOWLEDGE OF OUR CHILDREN

Question: If we are to maintain a competitive edge in the sciences, it is vitally important that our children develop unparalleled expertise in the sciences. This has been one of the main objectives of the Administration. Could you share with us what initiatives are underway to increase science knowledge of our children?

Answer: Non-National Science Foundation programs were discussed in the Precollege Science and Mathematics Education question.

National Science Foundation

1. Provides three year graduate fellowships to students at institutions of their choice. They also support NATO postdoctoral fellowships and Presidential Young Investigator Awards. The following information is provided: FY 86 $27.3 million; the FY 87 request is $27.3 million.

2. The College Science Instrumentation Program provides equipment for undergraduate teaching laboratories on a matching basis. The program emphasizes four year colleges. 15% of the 1350 proposals were funded in FY 86. The following information is provided: FY 86 $5 million; the FY 87 request is $6 million.

3. Request for proposal's and unsolicited proposals for (a) instructional materials development by the best educators and scientists, (b) teacher prep materials showing model programs and methods for elementary and secondary teachers, (c) creation, application and design of advanced technology (especially computers) for students and teachers, and (d) research in teaching and learning is supported. The following information is provided: FY 86 $22.7 million; the FY 87 request is $27 million.

4. (a) Presidential awards to high school math and science teachers, (b) networks for outstanding teachers, and (c) mass electronic communication, museums, nature centers and zoos are supported. The following information is provided: FY 86 $25 million; the FY 87 request is $29.3 million.

5. (a) Collection, analysis, evaluation and dissemination of information on the status of Science and Technology education, (b) maintenance of data systems to monitor educational progress, and (c) design and implementation of a systematic program evaluation are supported. The following information is provided: FY 86 $2 million; the FY 87 request is $2.4 million.

GRAMM-RUDMAN-HOLLINGS

Senator GARN. If we fail in the President's request or in the alternative, achieving the Gramm-Rudman-Hollings targets, what would a 10-percent reduction from currrent levels do to your operation?

Mr. MCTAGUE. Are you referring to overall R&D or the Office of Science and Technology Policy?

Senator GARN. Well, primarily the Office of Science and Technology.

Mr. MCTAGUE. A 10-percent cut from our 1986 budget would be welcome. A 10-percent cut in the overall R&D efforts, especially if distributed uniformly, would be exceedingly harmful, especially in the areas of basic research.

Basic research, as supported by the Federal Government, is performed mainly in our universities. It is normally assumed and argued that basic research is long-term, high-risk, and has uncertain payoff—sometimes 20 to 30 years distant. That is true of the knowledge that is generated and how it gets consumed in terms of an eventual product. However, there is a short-term and very important return that we get from the unique method that we have in the United States of funding basic research, mainly through universities. That is the training of new scientists and engineers.

Over 60,000 scientists and engineers, graduate students and postdoctoral fellows, receive funding from basic research grants every year from the Federal Government. They are a major resource that goes right out into the marketplace. They go back into universities and train another generation, or they enter industry. The short-term impact of cutting back on university support would be quite significant, I believe, in terms of our national competitiveness posture.

There are several other programs, of course, which are in the process of being ramped up, such as the President's SDI Program, space station efforts, et cetera, which, if cut, would severely decrease our options for the future.

BASIC RESEARCH

Senator GARN. While overall obligations for Federal R&D is proposed to go up 17 percent in fiscal year 1987, basic research is slated only for an 8-percent increase. Does this reflect substantial changes in priorities from earlier in the administration?

Mr. MCTAGUE. First, let me address the question of basic research. Basic research is going up very significantly in real terms, as proposed, in a manner that should keep funding on a relatively even keel, which is so necessary, partly for the reason that I mentioned earlier: because it involves the training of people. Turning on and off the funding for this training would be devastating.

The increases for basic research are significant, though they are at a lower level than in the past, they are not as high as the proposed increases for total R&D. Except for basic research, I would hazard a guess that the lion's share of the total increase in R&D is in the Defense Department, where it is going, in very substantial measure, not even toward development but toward testing and evaluation.

The Department of Defense changed its accounting system in the early 1970's so that the early testing of weapons systems now counts toward the development budget rather than toward operations. As a result of this, as we bring on weapon systems such as the MX and the D5, in their early phases—the first several flight tests, for example, which are very expensive—show up in the development budget. Whereas, in fact, in a normal corporate account, they would probably count as operations.

I think this is a good sign, it is a sign that the buildup in defense that we have been working on for several years is coming to fruition. The apparent skewing of the numbers is due, in fact, to these systems coming on line—not to a change in our research and development posture.

BUDGET RESOURCES

Senator GARN. You state that the President's budget request does not provide sufficient resources to do what is required of your Office. Could you provide for the record a detailed breakdown of your request to OMB?

Mr. MCTAGUE. I would be pleased to do that.

[The information follows:]

STANDARD FORM 300
July [illegible], Bureau of the Budget
Circular No. A-11, Revised.
[illegible]

OFFICE OF SCIENCE AND TECHNOLOGY POLICY
SALARIES AND EXPENSES

Object Classification (in thousands of dollars)

Identification code 11-2600-0-1-802		ORIGINAL FY 87 REQUEST	OMB APPROVAL	REDUCTION
	Personnel compensation:			
11.1	Full-time permanent	697	671	26
11.3	Other than full-time permanent	114	79	35
11.5	Other personnel compensation	15	5	10
11.8	Special personal services payments	568	198	370
11.9	Total personnel compensation	1,394	953	441
12.1	Personnel benefits: Civilian	82	82	0
21.0	Travel and transportation of persons	110	76	34
22.0	Transportation of things	4	3	1
23.1	Standard level user charges	459	365	94
23.3	Communications, utilities, and miscellaneous charges	124	97	27
24.0	Printing and reproduction	12	10	2
25.0	Other services	66	48	18
26.0	Supplies and materials	35	32	3
31.0	Equipment	243	5	238
99.9	Total obligations	2,529	1,671	858

Senator GARN. What functions will OSTP be unable to perform as a result of the OMB cuts?

Mr. MCTAGUE. I think first we have to look at what is essential to preserve, and some of the things that are essential to preserve are activities that are not enacted elsewhere, that involve operations, in particular, activities in telecommunications and continuity of government.

Beyond that, clearly, the President's strategic defense initiative is a major responsibility of our Office and a high priority of the President, and we will continue our efforts in that area.

Coordination efforts in many of the other programs, for example, biotechnology, perhaps in materials, et cetera, will suffer. There will be short-term savings in our Office, but I believe there will be long-term losses to the Government as a whole as a result of this.

DETAILEES

Senator GARN. Your Office has heavily relied on personnel detailed to it by other Federal agencies. The principal justification for these detailees were the unique and highly technical nature of issues which needed to be addressed on a short-term basis by OSTP. Since these detailees were outside the original budget purview of Congress, we require at least half their cost to be reimbursed. In your fiscal year 1987 request, the majority of reductions is taken from the detailee reimbursement, effectively doubling the staffing impact of the staffing budget reduction.

Why did you choose to apply in that area of the detailees and what appears to be a disproportionate basis?

Mr. MCTAGUE. Our Office is exceedingly small. We have, I believe, 15 full-time permanent slots. We are authorized for up to five Presidential appointments, including the Director of the Office, and four Associate Directors.

I believe that it is essential to preserve flexibility so that the next permanent director of the Office will have the capability to appoint such high-level people as he or she chooses. So, in order to maintain that flexibility, the budget was written as you have seen.

Being a small office, it may be that there will be a necessity for reprogramming, as an examination may show.

SPACE RESEARCH/CHALLENGER TRAGEDY

Senator GARN. OSTP has obviously been very active in the field of space policy and been involved in the consideration of space science issues, shuttle pricing, and aeronautic space technology. Obviously, with the Challenger tragedy it has both very serious impacts on both budgetary and programmatic considerations for our space program.

What role do you expect to play in answering some of these questions after we have gone beyond the issue of the accident itself to restoring our shuttle capacity, our space policy in the future? What will be the expected play?

Mr. McTAGUE. I personally sit on the Senior Interagency Group for Space, which is coordinating the administration's activities in the area of collecting information about alternatives for the future, cost of scheduling for a possible fifth orbiter, the flexibility for shifting to ELV's, whether we should reexamine and further stimulate encouragement of private-sector launching capabilities, and what are the actual capabilities presently available with three launch vehicles. These issues are being coordinated quite closely with the appropriate offices in NASA, the Department of Commerce, the Department of Transportation, and the Department of Defense.

FOURTH ORBITER

Senator GARN. Do you have any idea when you might expect an answer on a fourth orbiter?

Mr. McTAGUE. I can't speak definitively right now, because we don't have all the information yet. We are pretty close, I think, to having it on the alternative. I would estimate within 2 to 3 weeks.

Senator GARN. As I am sure you are well aware of the need to proceed, with the length of time. I am one who thought we should have had a fifth orbiter prior to this ever happening. I never believed we could maintain 24 flights a year with four orbiters in any event.

I also hope that we are able to make some policy decisions, not getting so much involved in the circus that now goes on in regards to the investigation. I am sure you are very well aware of how personally involved I was with the accident as far as the people involved. I am distressed with the circus going on in the news media; that I, frankly, have a very difficult time understanding in light of 50,000 people killed on the highways of this country a year, 20,000 to 25,000 of them due to drunk driving. We can lose an aircraft regularly, over 1,000 people in commercial aviation accidents last year, and we are content to wait for the National Transportation Safety Board to do a methodical, scientific, careful investigation and come up with the results.

As I said, no one can feel more badly about losing seven people, where I knew them all, so well than I. Yet it was seven. Yet nobody is content to wait, but to deal in speculation. We have scientific people who dip O-rings in ice water on the table. I don't know what in the hell that proves, that something gets hard when it gets cold. I think all of us know that.

We deal in memos from budget analysts who admit they are not engineers that have great revelations that somehow, these seals and joints are dangerous and somehow the crews were misled, and we were not aware of that.

You don't have to be too bright when you go out to that pad and sit on it and recognize that everybody else is 3½ miles away. That ought to tell you something to begin with.

Also, you don't have to be too bright in the training to figure out that when you have got 4.3 million pounds of fuel, the most likely place for failure is in a joint, and when you have schematics that show how the slip joints go together and the O-rings go together, and then that memo which has been made so much of by the press, that if one of those fails, you could have a catastrophic accident.

I mean, I think my 6-year-old could figure that out. All of us could figure that out, if you have 6,000 degree temperatures acting on an external fuel tank filled with liquid hydrogen and oxygen.

Needless to say, I am distressed by the nature of the investigation.

The hard questions must be asked. Don't misunderstand me. NASA and whoever else is involved must be held to account. We must find out exactly what happened.

It seems to me the investigation has gone more into the area of trying to find somebody to blame rather than to find out what happened and fix it and get on with it, especially the issue of pressure to launch.

It is amazing to me how the press, all these years, could ask me questions over and over again about why all the delays, why NASA has not been meeting their schedule, and certainly, if that pressure was there with all the press attention my flight got, there would have been pressure to launch, but I never saw NASA in five delays in my flight, from February until April, that there was any indication that they felt any pressure to launch because I was on board.

As a matter of fact, four out of the five cancellations in my flight were for flight safety. We saw all the cancellations on Bill Nelson's flight. We saw cancellations on Challenger, including two of them, one on Sunday. I was down there Saturday night to talk to Christa McAuliffe's class and all the other 110 teacher finalists, and they canceled 12 hours before on the basis of a weather forecast.

My thought at the night viewing was: That is premature. If it had been me, I would have tanked up and looked at the weather in the morning, and as you know, what turned out to be a beautiful morning, on Monday, they cancelled again because of a minor problem. But on Tuesday, somehow, we are now supposed to believe that there is great pressure to launch and that people ignored all kinds of information or something is terribly flawed in the management decision process.

It ignores 24 successful launches, most of which had delays for relatively minor problems; ignore all of that, and somehow, it was different on Sunday and Monday than it was on Tuesday, and we had some great pressure to launch.

Well, we are going to find out. Somebody made a mistake. Somebody made an error in judgment. That is always the case in accidents, no doubt about it. But the indication and the circus that is going on that somehow, somebody went ahead with it knowing that this was a likely possibility is the biggest bunch of baloney I have ever heard, and I think the record is there to prove it.

I didn't mean to get off on that, but I will guarantee you that this subcommittee will hold hearings when we have some factual information on which to base oversight hearings, and the last thing on Earth we need right now is politicians sticking their neck in it. The press and the Presidential Commission are doing quite a good enough job in all the speculation without politicians adding to it and trying to get their faces in the TV and in the newspaper and so on, with every little rumor that goes along.

So we will hold hearings, oversight responsibility, when there is something to ask questions about, when there is factual information to be given.

So then I hope we can get on with the question that I asked you, which is not your responsibility, to be involved in the accident investigation, but to see if we can get back on track to basic research and development and a space policy that produces so much knowledge here on Earth.

I wish we could get people to focus on what we have gained from space, too, rather than all the original members of the Flat Earth Society who probably have been on the beaches of Portugal telling Columbus he was a damn fool and, "Come back."

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS

The Fiscal Year 1986 Appropriations Act provided that up to $500,000 in programmatic support may be provided by NST for the International Institute for Applied Systems Analysis.

This sum was approved after considerable discussion over the scientific value and merit of research of the Institution's security considerations and perhaps more significantly, the international relations aspect with respect to such activities.

Your Office devotes considerable attention to international science and technology issues.

Do you believe that this support should be continued?

Mr. McTague. I think this is a matter for careful judgment by the State Department, from the point of view of its international relations aspects and from the point of view of programmatics on the part of NSF.

We have brought NSF and the Department of State together to try to decide on a sensible evaluation method for the proposal that is in process at the moment.

It is a very tricky issue, because it involves weighing international policy, cost-benefit, technology transfer, and programmatic issues. When the full facts are in, if the two agencies can come to agreement, the issue should end there. If there is substantive disagreement, one then we will intervene.

Senator Garn. It has been suggested by some that the limitations on NSF's budget, when you get into these areas that are primarily or substantially for international relations or international in character, that the State Department ought to be funding those. Would you concur with that view?

Mr. McTague. The State Department does provide some funding in such areas. I think the advantage of NSF's involvement is their superb history on quality.

Senator Garn. Does that mean at the time the State Department does not have superb quality?

Mr. McTAGUE. Not in the areas of——

Senator GARN. I am being smart, because I don't notice superb quality in very much they do, let alone in scientific capabilities.

Mr. McTAGUE. They certainly don't have the quality to make scientific judgments, and NSF is superb.

DEPARTMENT OF SCIENCE AND TECHNOLOGY

Senator GARN. Your remarks indicate that almost all nations have established ministries of science and technology or an equivalent. Our decentralized system of government has characteristically responded much more diffusely.

While this stops short of calling for a department of science and technology, it does appear that you are not satisfied with our own Government's research organization. Is that a fair characterization of your views?

Mr. McTAGUE. I should hope I am not satisfied. If we can't do better, we are in trouble. I think we should always strive to do better.

I don't think the present system serves us ill. I think the diversity of activities and the diversity of agencies involved provides a certain sort of statistical wisdom to the process, much like the statistical wisdom of the electorate in areas where it is very difficult to predict what the future should be.

On the other hand, completely uncoordinated activities would result in a very substantial amount of duplication. The present system is awkward and needs some adjustments. Whether a department of science and technology is the right approach, I think, is something that should be subject to national debate. I don't have a position on it.

Senator GARN. But you certainly would think we need to have some high-level focus, or at least some means of eliminating overlap and duplication? I understand what you are saying about diversity, but there needs to be some coordination and direction of that diversity is what I hear you saying.

Mr. McTAGUE. Absolutely, but not a dictator of activities.

Senator GARN. Do you find between OSTP and OMB that there is a very difficult prioritization process? Do you think that is adequately achieved, or OMB is just so looking at the bucks that they don't have the capability to make scientific determinations either?

Mr. McTAGUE. In most areas of the R&D budget, we coordinate closely with OMB and, I believe, rather effectively. OMB starts off, of course, from a different perspective than we do. We are usually accused of being tin cup rattlers, and they are accused of wearing green eyeshades, and there is some truth to both of those. But I think the working relationship is very good, and, in most areas, our technical expertise is heavily relied upon. There is a good relationship between OSTP and OMB.

AGRICULTURAL RESEARCH

Senator GARN. An example of scientific priorities conflicting with the economic priorities may be in the agricultural research budget. Your budget justification underscores the value of genetic manipulation to revolutionize agriculture, yet the largest increase requested for the USDA research budget is for work on finding new means of disposing of surplus agricultural commodities, not to increase production efficiency.

Do you feel that the overall planning of Federal priority setting should shift the current financial balance away from economic concerns?

Mr. McTague. This is a constant battle in any agency, requiring that a constant set of judgments be made. Similar problems crop up in the Department of Energy, for example, about how to make such judgments.

I believe that it is essential that the long-term investment for efficient agricultural production—be in such areas as genetic manipulation and plant biotechnology, which have an enormous payoff.

We have also short-term problems in utilization. I am afraid to use the phrase "utilization of disposal capability." I would prefer that we didn't have to do that, but it is a reality.

Senator Garn. Thank you very much, gentlemen. I have no additional questions for you this morning.

SUBCOMMITTEE RECESS

The subcommittee will stand in recess until Wednesday, March 5 at 10 a.m. in room SD–124, when we will hear from the National Science Foundation and the Federal Emergency Management Agency on their 1987 budget requests.

Mr. McTague. Thank you, sir.

Senator Garn. The subcommittee is recessed.

[Whereupon, at 11:10 a.m. Tuesday, February 25, the subcommittee was recessed to reconvene at 10 a.m. on March 5.]

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

WEDNESDAY, MARCH 5, 1986

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10 a.m. in room SD–124, Dirksen Senate Office Building, Hon. Jake Garn (chairman) presiding.

Present: Senators Garn, Abdnor, D'Amato, and Leahy.

NATIONAL SCIENCE FOUNDATION

STATEMENT OF ERICH BLOCH, DIRECTOR

BUDGET REQUEST

Senator GARN. The subcommittee will come to order.

The National Science Foundation is the principal Federal agency for the support of basic research across all fields of science. NSF accounts for about 25 percent of all Federal support for research going to academic institutions. About 2,000 colleges, universities, industrial firms, and other organizations participate in NSF programs through over 13,000 grant awards.

For fiscal year 1987, you are requesting $1.7 billion. This represents a total increase of $161.8 million composed of: an increase of $126.6 million in research and related activities; $1.9 million in the Antarctic Program; and $33.5 million in science and engineering education.

Mr. Bloch, I am pleased to welcome you before the subcommittee again. Please proceed with a summary of your opening statement.

Mr. BLOCH. Thank you very much.

I have a prepared statement that, with your permission, I would like to submit for the record, but I don't think I will go through it; I will highlight it.

Senator GARN. We will be happy to place your entire statement in the record.

Mr. BLOCH. Thank you very much.

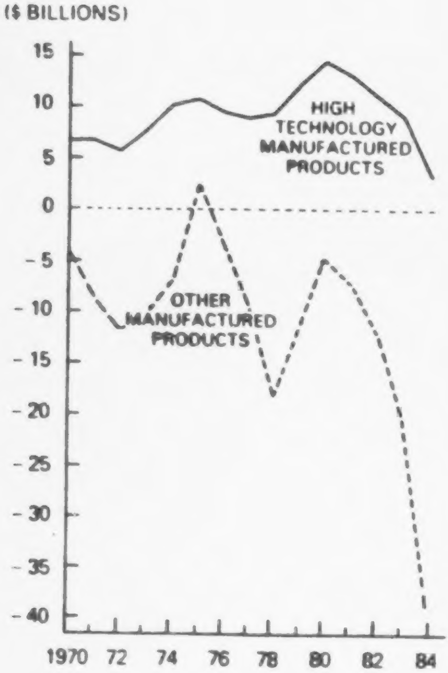
SUMMARY OF STATEMENT

Mr. Chairman, there are three basic reasons why the Federal Government supports research and education in the sciences and engineering. They are: for its intrinsic intellectual value; because Government needs the results; and for economic competitiveness.

The Foundation has long been dedicated to the first reason—intrinsic intellectual value. And the Congress has long supported this quest to do the best possible science in every field. We will continue to support excellence in pursuit of this goal, as we always have.

The second goal is to create the new knowledge that Government itself needs in support of specific missions such as defense, health, or agriculture. This is principally the concern of the mission agencies.

I will concentrate my remarks this morning on the third goal, that of economic competitiveness. This is the area in which the Nation is most in need. It is an area in which the National Science Foundation has much to offer, and it is the rationale behind our major budget thrusts of this year. It is no secret that the world has become a much more competitive place in recent years.



U.S. TRADE BALANCE IN HIGH-TECHNOLOGY AND OTHER MANUFACTURED PRODUCT GROUPS, IN CONSTANT DOLLARS

CHART 1

To demonstrate that, we have a number of charts which you have in front of you. If you would please turn to chart 1, what I am showing you here is essentially a fact that is well known, that our trade balance is overwhelmingly negative, and becoming more so. Even the advantage in high-technology products on the top of this particular chart that we once took for granted is eroding.

It is just one example, as is the semiconductor industry. Every day, when you turn to the paper, there is another bad news story on that.

In both high- and low-technology products, the markets in which we must compete are increasingly international. The company that is first in the market with the most technically advanced product at the best price is the only one that will succeed.

IMPORTANCE OF RESEARCH

Now, why is research important? Research provides the underlying base for the new products that we need to compete in high-technology areas and the process improvements that can raise productivity in low-technology manufacturing and service industries.

CONTRIBUTORS TO U.S. PRODUCTIVITY INCREASES

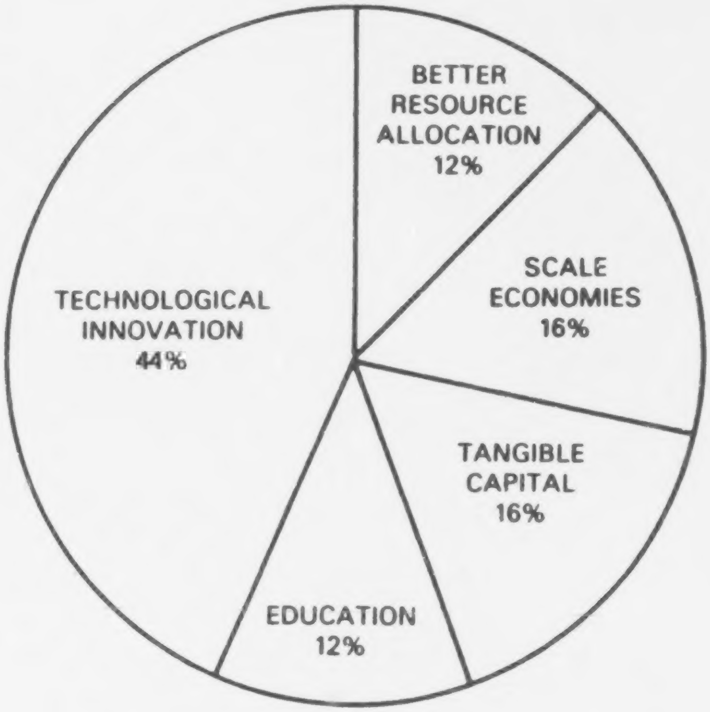


CHART 2

If you turn to chart 2—and this is a study that has been done repeatedly over the years—one can see that nearly half of all productivity gains since World War II have been caused by technological innovation. Not that other items are not important like training, capital, scale, economics, and so forth.

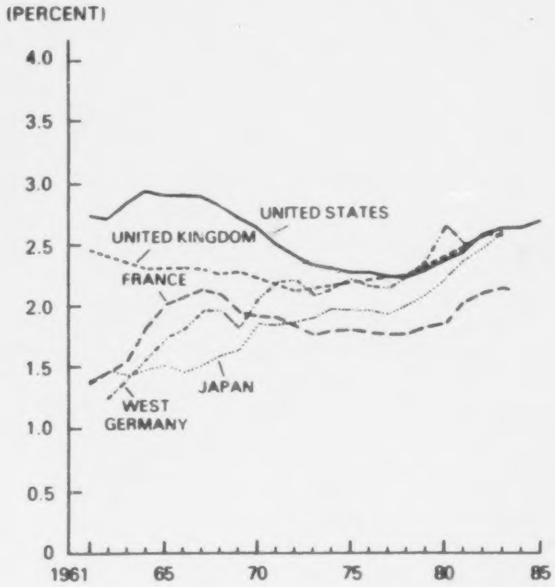
But technological innovation is the major contributor to productivity increases.

Many of NSF's programs support this process of innovation, robotics, engineering research centers, biotechnology, materials research, and the education of future scientists and engineers and many more.

U.S. RESEARCH INVESTMENT

Research is the right way to enhance our international competitiveness and is far preferable to reliance on trade barriers or other protectionist measures.

The question then arises: Are we doing enough research and education? As our society becomes more and more dependent on technology, we must be sure that we do three things: Support basic research adequately; and on the line of basic research, educate enough new scientists and engineers; and invest sufficiently in research facilities and equipment. Because without that, we cannot perform basic research, and cannot educate and train our people.



NATIONAL EXPENDITURES FOR PERFORMANCE OF RESEARCH AND DEVELOPMENT AS PERCENT OF GROSS NATIONAL PRODUCT BY COUNTRY

CHART 3

Are we investing enough in research itself? If you turn to chart 3, you can see essentially that while we were far ahead of any other country in the past, the other countries are catching up with us, if you measure it as a percent of GNP. So we have lost some of our advantage that we had in the past.

ESTIMATED RATIOS OF NON-DEFENSE R&D EXPENDITURES TO GROSS NATIONAL PRODUCT (GNP) FOR SELECTED COUNTRIES

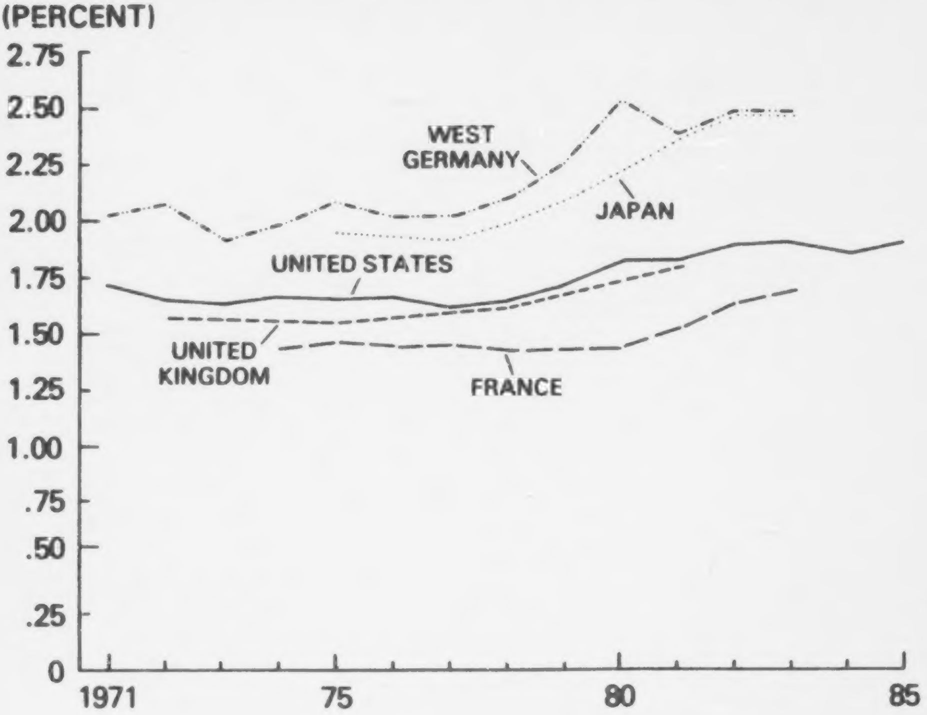
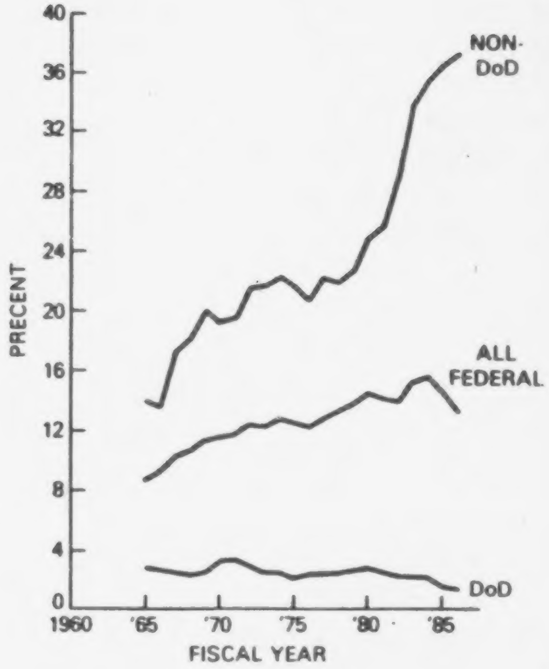


CHART 4

Furthermore, as you turn to chart 4, the proportion of our R&D that goes for military purposes has been both high and rising. When we consider only civilian-oriented R&D, which is the part that is most economically relevant, we find that our level of effort is behind that of West Germany and Japan.



BASIC RESEARCH AS A PROPORTION OF ALL R&D

CHART 5

An encouraging trend, however, as I want to show on chart 5, is that our Federal expenditures for civilian R&D are increasing for basic research.

Civilian development expenditures in Federal R&D, quite properly, have been left to industry.

Is there an optimum level of support for basic research? There is no numerical simple answer to that question, but I think we should consider a number of facts. Basic research is dropping as a proportion of total Federal support, and we see that in the middle curve of chart 5, despite the increases that we have had in civilian basic research.

And if we see increasing competition from our trading partners as we do, and if we see shortages of scientists and engineers developing, as we all do—and I will come back to that point in a minute—and if we all agree that facilities and instrumentation in universities are in a deplorable condition, and they have been for the last few years, and we have tried to rectify that situation, but we have a long way to go. If all of these things are true, then we can only conclude that we are underfunding basic research, especially basic research in the universities.

SCIENCE AND ENGINEERING PIPELINE

Let me address the people problem for a minute. As the society becomes more dependent on technology, we will need more of our population educated in science and engineering. A consequence of underfunding basic research, however, is that we are attracting too few young people to these areas.

SCIENTISTS AND ENGINEERS ENGAGED IN RESEARCH AND DEVELOPMENT PER 10,000 LABOR FORCE POPULATION BY COUNTRY

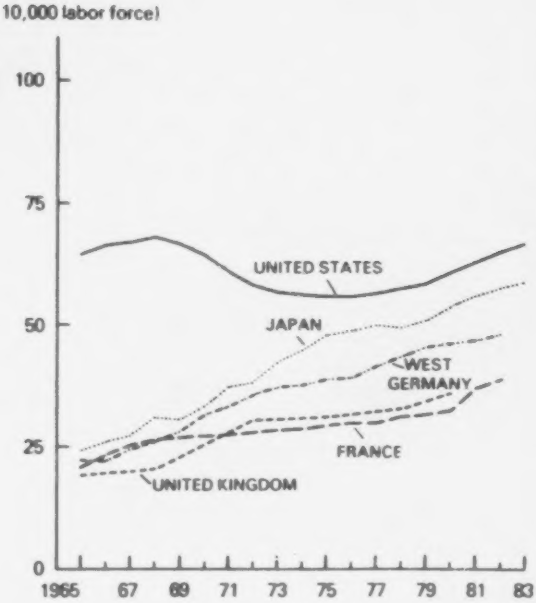
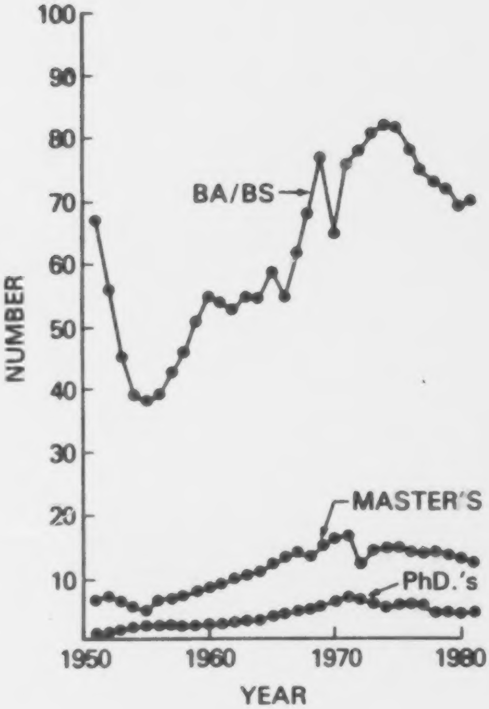


CHART 6

As chart 6 shows, 20 years ago the United States had far more scientists and engineers per capita or per labor force per capita than some of our trading partners. As you can see, Japan, West Germany, France, and the United Kingdom are on an increasing kind of a slope. We have been on a decreasing one, and only in the last few years on a slightly increasing slope.



SCIENCE/ENGINEERING DEGREES PER THOUSAND IN APPROPRIATE AGE COHORT, 1950-1981

CHART 7

Another measure is the proportion of our young people, which I am showing on chart 7, that are being attracted to science and engineering. Twenty years ago in the United States, the proportion of our young people who were being attracted to this area is declining as a percent of the appropriate age cohort. You see that on the top, in the undergraduate area. You also see it in the master's degree and the Ph.D. degree area. So we are attracting fewer people proportional to science and engineering than we did in the past.

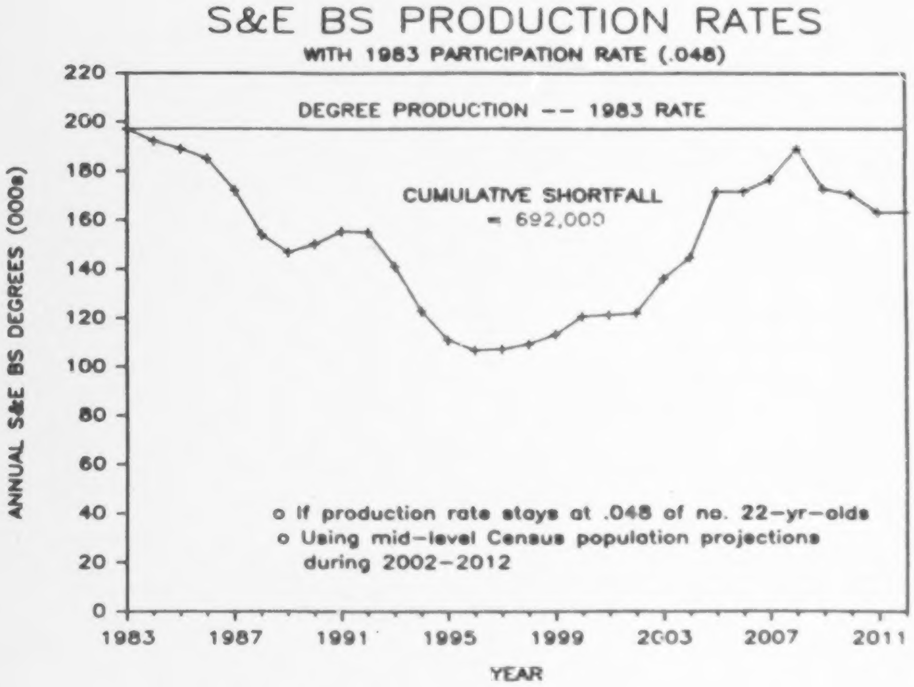
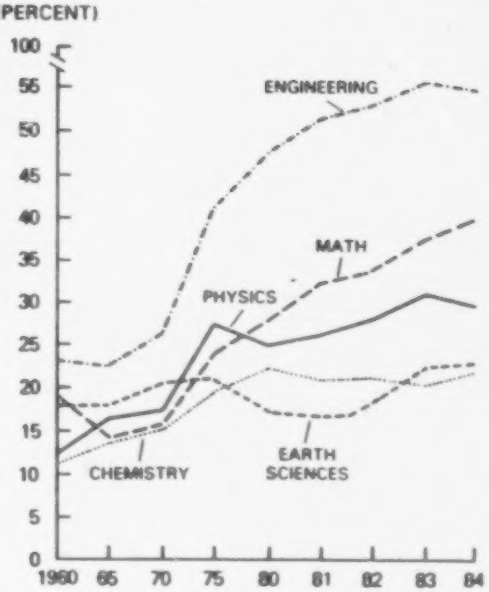


CHART 8

If you now extrapolate from this particular trend into the future, and you assume that the participation rate is the same in the future as it was in 1983, chart 8 shows you essentially that we will encounter a cumulative shortfall over the next 20 years of some 100,000 people. I want to caution about these numbers.

They are not 100 percent correct. This is a trend that we are seeing that, if it continues in that particular way, should give us some food for thought.



DOCTORAL DEGREES AWARDED TO FOREIGN STUDENTS AS A PERCENT OF ALL DOCTORAL DEGREES FROM U.S. UNIVERSITIES, BY FIELD

ENGINEERING, MATHEMATICS, AND PHYSICAL SCIENCES

CHART 9

Increasingly, we are dependent on foreign nationals for new Ph.D.'s in engineering, in mathematics and in physics, the most critical disciplines of a technological society, and I show that on chart 9, where, in engineering, for instance, 55 percent of the Ph.D.-degreed people that are studying in this country are foreign nationals.

While they benefit from this particular kind of thing, many of the students stay here and join our work force. I believe that we have an overdependence on a resource that is not under our control. That, again, is something that we should consider.

So in summary, Mr. Chairman, the strongest case that we can make for the support of the President's budget request for the National Science Foundation is that we must begin to do something about the trends that I have just outlined. It is encouraging that even in this age of austerity in funding, the administration, in this year as well as last, has recognized a need for an increase in our budget.

The proposed increase will go where it will do the most good, to support basic research and education in the fields most critical to our economic competitiveness.

SPECIAL EMPHASIS AREAS

We have four areas of special emphasis this year. Biotechnology, computational science and engineering, global geosciences, and the fourth area is a broadened participation in science and engineering by underrepresented groups or underrepresented institutions to fill that gap that I talked about before that is opening up on us in the future.

The details of each of these emphases are described in my prepared statement. I will not get into it unless you want to discuss it later on. I want to emphasize here that each of these areas here is focused directly on our economic problems. The first three are critical research areas in which new knowledge can be the basis for expanded industrial activity, and the last one has to do with people in education.

Mr. Chairman, I would like to leave you with one overriding thought. Investment in science and engineering research and education has been the source of much of our economic progress in the last four decades. It continues to be the best single way that we can provide the jobs and national welfare that we must have in decades to come.

I urge this committee, and I urge you, Mr. Chairman, to ensure that we have the resources necessary to make this investment in our future. Thank you very much.

[The statements follow:]

STATEMENT OF
MR. ERICH BLOCH
DIRECTOR, NATIONAL SCIENCE FOUNDATION
BEFORE THE
SUBCOMMITTEE ON HUD-INDEPENDENT AGENCIES
COMMITTEE ON APPROPRIATIONS
U.S. SENATE
MARCH 5, 1986

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

It is a pleasure to meet with you today to discuss the FY 1987 Budget Request for the National Science Foundation.

Mr. Chairman, I want to focus on the context for the 1987 NSF budget: the importance of basic research to the nation, the strategy underlying the 1987 request, and some highlights.

BASIC RESEARCH IN THE UNITED STATES

The Federal government will provide about $61 billion for support of R&D activities in FY 1987. Basic research accounts for only $8.6 billion, or 14%, of this total. Federal support of basic research is estimated to increase by 8% in FY 1987. Since a higher percentage increase is projected for support of development activities, the already small share of research dollars that are devoted to basic research is dropping.

Contrary to other countries, in the U.S. about half of all basic research activity takes place in colleges and universities. We have chosen to locate so much of the federal support for basic research at our academic institutions because in this way we can ensure the continued production of top quality scientists and engineers for academia, industry, and government. As a consequence, higher education and research are inexorably intertwined; supporting one is supporting the other.

The President's Budget Request for NSF shows an increase of 15.6% above the new obligational authority provided for FY 1986 as altered by the Gramm-Rudman process. This signals the emphasis this Administration places on basic science and engineering as a force for present and future competitiveness, as a prerequisite for the products and services that improve the lives of our citizens, and as a base for building a strong national defense.

This increase occurs even in the face of large federal deficits and efforts to reduce federal spending because investment in basic science and engineering is essential to improving our competitiveness internationally and reducing our trade deficit.

NSF has a unique role in the federal support of science and engineering research and education. Our programs provide support for promising ideas across all fields of science and engineering and complement the support provided by the more mission-oriented federal agencies.

NSF accounts for less than 3% of the federal support for total research and development. However, it provides nearly 17% of federal basic research dollars and about 25% of the federal support for basic research at colleges and universities. This support allows researchers to tackle problems that require longer-term investments not directly driven by the need for specific applications. It is from support such as this that genuine breakthroughs occur, innovation is stimulated and Nobel prizes are earned.

PROBLEMS AND BUDGET STRATEGY

The problems that we must address are the following:

1) Our support of basic research and education in science and engineering needs strengthening when one considers the increasing rate at which advances and new developments are taking place and the progress (and increasing emphasis) that other nations are making in this area.

2) We are not attracting enough young people to science and engineering to assure an adequate supply in the future.

3) Our investment in the infrastructure of science and engineering--equipment, instrumentation, and facilities--must continue.

The Foundation's budget strategy for FY 1987 addresses these issues. This strategy

- provides for continuity by maintaining balanced support for research of proven quality across all disciplines,
- ensures change by investing significant resources in a selected number of areas that offer particular promise for scientific and engineering advances, and
- stresses fiscal responsibility by leveraging Federal resources wherever possible and by phasing down or terminating activities of lower priority or lesser promise.

STIMULATING COMPETITIVENESS AND INNOVATION

Economic competitiveness is an important subject at this time in our nation's history. We have gone from being a creditor nation to one with growing trade deficits. Trade protection, however, is not the answer; developing and being first in the use of new technologies is the answer. Therefore, support for basic research and education in science and engineering is essential. Even in the short term, investments in basic research will help to improve our competitiveness. In the longer run, failure to provide substantial support for basic research and education is sure to have grave consequences.

Through support for such programs as the Engineering Research Centers, initiated in FY 1985, we are providing opportunities for industrial and academic engineers and scientists to work together in areas of inquiry which require a stronger fundamental research base for future advances. These centers also provide experiences for undergraduate and graduate students which can better prepare them for careers in industrial research. Six centers have been established. We will very shortly announce awards for four or five more, and the FY 1987 budget request includes support for an additional four centers.

There is great potential for long-term economic payoff in other research areas, including materials, chemistry, computer science and biotechnology. All of these areas receive enhanced support in FY 1987, both in ongoing base programs and through the special emphasis areas of computational science and engineering, biotechnology, and global geosciences.

Our efforts in support of research conducted by small businesses and of joint industry-university research ventures are directly aimed at encouraging innovation and building stronger links between basic research activities of today and economic advances in the future.

DEVELOPING SCIENCE AND ENGINEERING PERSONNEL

The human resource pool that will provide the scientists and engineers of the future is critically important. For the young men and women already in the career pipeline, NSF provides support for the initiation of individual research programs at colleges and universities, for postdoctoral opportunities, and for graduate research assistantships and fellowships. At the undergraduate level, and particularly the precollege years, where career decisions are not yet firm, the Foundation directs special efforts toward making scientific and technical careers attractive and attainable. In all of these efforts, increasing the participation of women, minorities, and physically disabled persons in the scientific and engineering activities is an important Foundation goal.

Support for precollege science and mathematics activities is stabilized at the FY 1986 level. The FY 1987 program builds on, and continues, activities begun earlier. These include materials development, informal education, teacher preparation and enhancement, and studies and assessments. These activities are all consistent with the functional objectives as described in the reauthorization of the Education for Economic Security Act, P.L. 99-159. All of the science and mathematics fields taught at the K-12 levels are covered. In the teacher enhancement area, about 10,000 teachers per year are participating in projects. The goal of these activities is to improve the quality of precollege instruction in science and mathematics, provide meaningful out-of-school experiences for young people, and stimulate young men and women to consider careers in science and engineering fields.

The science and engineering education management study mandated in the FY 1985 Appropriation for NSF has just been funded. The study will be completed in 18 months, with several interim reports required. As information becomes available it will be used in updating and reformulating the Science and Engineering Education long range plan.

IMPROVING THE PHYSICAL INFRASTRUCTURE OF SCIENCE AND ENGINEERING

Advances in science and engineering are increasingly dependent on the equipment available to researchers. Instrumentation and facilities must be of the highest quality possible if we are to maintain our science and technology base and realize future advances.

In recent years, we have reduced or rescheduled several major capital investments in research facilities This has been a necessary and appropriate response to financial constraints. However, it does not constitute an acceptable long-term policy for research support. This budget includes support for on-going capital improvements; no new starts are included.

Each facility improvement has been carefully examined to ensure that the support we are requesting balances the need for fiscal restraint and the scientific need for the facility. For example, the Cornell Electron Storage Ring upgrade will continue (although its completion will be delayed one year), while construction of the Michigan State University Cyclotron and the Indiana University Cooler Ring will be completed. Support for the construction of the Very Long Baseline Array will be maintained at essentially the FY 1986 level.

Modern research requires state-of-the-art instrumentation and equipment. Accordingly, the FY 1987 budget request includes fundsfor increased investment in discipline-specific research instrumentation programs and for an expansion of the College Science Instrumentation Program. Total support for instrumentation and equipment increases from $223 million in FY 1986 to $260 million in FY 1987. Increases for instrumentation occur throughout the disciplines supported by the Foundation, with special attention focused on the biological sciences this year.

LEVERAGING FEDERAL DOLLARS

NSF continues in FY 1987, as in previous years, to leverage Federal dollars by encouraging and requiring the participation of private sector organizations, academic institutions, and state and local governments as partners in funding research and education. Some programs require contributions from these and other sources.

Examples of the successes we have achieved in attracting outside funding to complement and extend the support by NSF:

- The six Engineering Research Centers established last year have generated approximately $13 millionin industrial support;
- The National Advanced Scientific Computing Centers which were also initiated last year have raised a 40 cent match for every dollar the Federal Government spends;
- The $5.5 million provided for the FY 1985 College

Science Instrumentation program awards will be matched by at least an equal amount; and

- The FY 1984 class of Presidential Young Investigators has succeeded in obtaining nearly $11 million in matching funds.
- So far during FY 1986, $1.9 million NSF investment in precollege instructional development has been matched by nearly $9 million from other sources.

THE NSF BUDGET REQUEST FOR FY 1987

The strategy we have adopted is embodied in the Foundation's FY 1987 Budget Request, which totals $1,685.7 million or 13.1% above the approved FY 1986 Post Gramm-Rudman-Hollings (G-R-H) Current Plan of $1,489.8 million. This Current Plan is composed of $1458.3 million in New Obligational Authority (NOA) and $31.5 million deferred from FY 1985 for use in FY 1986 for Science and Engineering Education. The FY 1987 Request is therefore 15.6% above the FY 1986 NOA. It includes:

- $1,479 million for Research and Related Activities, an increase of 14.3%
- $117 million for the U.S. Antarctic Program (USAP), up 6.4%. (A budget base transfer of $14.4 million was made to the U.S. Coast Guard to cover basic icebreaker services. Those funds include part of a $3.0 million increase in Coast Guard charges.
- $89 million, or a 64.4% increase, in NOA for Science and Engineering Education. It should be remembered that in FY 1986, the program level is $87M and consists of $55.55M in NOA and $31.5M in deferred resources.
- $0.7 million in Special Foreign Currency funds.

This Budget Request, if approved by Congress:

- Will maintain balanced support for research of proven quality across all disciplines.
- Will allow significant increases for a small number of multidisciplinary special emphasis areas where additional funding can have a multiplier effect by establishing new institutional arrangements and capabilities for encouraging the collaboration that accelerate scientific productivity.
- Will provide support for facilities which are an integral part of research activities in fields such as physics, materials, advanced scientific computing, astronomy, and the geosciences.

- Will stabilize funding for the Science and Engineering Education activity, maintaining the FY 1986 level for graduate and precollege programs and an increase for the College Science Instrumentation Program.

Highlights of the specific research activities and programs of the Foundation follow.

MATHEMATICAL AND PHYSICAL SCIENCES (MPS)

The FY 1987 Budget Request for MPS is $449.3 million, an increase of $56.6 million, or 14.4 percent, over the FY 1986 Post G-R-H Current Plan. Increases are requested for all of the subactivities: 12% for Physics and Materials Research, 16% for Computer Research, 18% for Chemistry and 16% for Mathematics.

Emphasis on Mathematical Sciences continues the Foundation's priority to rebuild the personnel base in U.S. mathematics, a discipline which underlies much of the work that is undertaken across the science and engineering disciplines.

Also included in the MPS Request are: enhanced support for research on advanced computers, increased support for chemical instrumentation, expansion of the Materials Research Groups, and funds for design of a prototype for a gravity wave detector.

MPS disciplines will play a major part in the Foundation-wide emphasis in FY 1987 on computational science and engineering. Through this emphasis research on new or improved methods of solving scientific problems using advanced computers and algorithms will be supported. Mathematicians, computer scientists, and scientists and engineers from other disciplines will form collaborative teams to attack complex problems in an integrated, complementary way.

ENGINEERING (ENG)

Much of the focus of the research programs of the Engineering Activity is on high-leverage, fundamental and cross-disciplinary research aimed at expanding the engineering knowledge base, stimulating innovation, and contributing, in the long term, to national economic competitiveness.

The FY 1987 Request for Engineering is $185.5 million, an increase of $30.9 million, or 20.0 percent over the FY 1986 Post G-R-H Current Plan of $154.6 million. The Engineering Research Centers program is increased to a total of $35 million. Up to four new centers will be initiated in FY 1987, bringing the total to 15.

Increases for ENG will enhance its participation in the Foundation's special emphases in biotechnology and computational science and engineering. Other areas chosen for enhancement include design, manufacturing and systems integration and materials processing, areas where international competition is keenest.

BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES (BBS)

The FY 1987 Budget Request for BBS of $282.4 million is an increase of $34.9 million or 14.1 percent over the FY 1986 Post G-R-H Current Plan. Increases for BBS subactivities range from 12 to 14 percent, except for Information Science and Technology which shows a 35 percent increase.

This large increase in Information Science and Technology results from research emphasis on advanced computers, such as distributed systems and parallel processing machines. Additional emphasis is being placed on problems of scaling up from theoretical to implemented systems. Improved instrumentation support is a key component of this increase.

The main focus in BBS continues to be progress toward increasing knowledge about life and social processes. Primary emphasis is placed on research related to biotechnology. Two to four biotechnology research centers will be established and departmental awards for multi-user equipment will be provided. In addition, crossdisciplinary training for advanced students will be emphasized.

Throughout the BBS Activity, increased funds have been included for the instrumentation necessary to keep pace with fast-moving research developments. In addition, through its Biotic Systems and Resources subactivity, BBS will collaborate with the Astronomical, Atmospheric, Earth and Ocean Sciences Activity in research efforts in global geosciences.

ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES (AAEO)

The FY 1987 Budget Request for AAEO of $383.2 million is an increase of $36.8 million, or 10.6 percent over the FY 1986 Post G-R-H Current plan of $346.4 million. This increase is not evenly distributed among the five subactivities within AAEO, and ranges from six percent in Astronomical Sciences to 18 percent in Earth Sciences. The majority of the increase is devoted to two new emphases--global geosciences and computational science and engineering--as well as to a continuing emphasis on studies of the continental lithosphere.

Increases in Atmospheric and Ocean Sciences are planned for global studies of ocean circulation; the physical climate system, including the interaction between the atmosphere and oceans; the chemistry of the troposphere, cycling of biological and chemical species through the atmosphere, oceans, and seafloor; and the interrelated processes occurring at ocean ridge crests. The remainder of the Budget Request will be used to maintain support for high quality research projects and operation of major facilities, including the national astronomy centers, the National Center for Atmospheric Research (NCAR), and the Ocean Drilling Program.

SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS (STIA)

STIA carries out activities that cut across all the scientific and engineering disciplines supported by the Foundation. In addition, STIA serves as a management focal point for many of the cross-disciplinary programs which are funded by the research directorates.

The FY 1987 Budget Request of $47.0 million is an increase of $9.1 million, or 24.0 percent over the FY 1986 Post G-R-H Current Plan of $37.9 million. The largest part of the increase, $4 million, is to initiate a new program of Minority Research Centers of Excellence. These centers are designed to increase more rapidly the participation of minorities in science and engineering by upgrading research and teaching capabilities of selected minority institutions.

Other increases in the STIA Budget Request include $2.3 million for the Small Business Innovation Research (SBIR) program, for a total of $17.15 million, and $2.4 million for international programs, for a total of $12.7 million. In addition, the study of university facilities and instrumentation mandated by the Congress will be continued through the Science Resources Studies subactivity. Policy Research and Analysis support remains at the FY 1986 level.

ADVANCED SCIENTIFIC COMPUTING

The FY 1987 Budget Request for Advanced Scientific Computing is $53.6 million, $10.6 million or 24.7 percent over the FY 1986 Post G-R-H Current Plan of $43.0 million. This increase will allow the continuation and further development of advanced computing resources for science and engineering research.

The four national centers established in FY 1985 and FY 1986 will be enhanced and their services expanded to more scientists and engineers. No new centers will be initiated in FY 1987. The interim resource center effort will continue to be phased down in FY 1987 as the national centers build up to full operational capacity.

The development of a national network linking scientists and engineers with the national computing centers and each other will continue in FY 1987. Support for the experimental computing center at Cornell University will be maintained, as will support for the use of other experimental hardware and software development.

U.S. ANTARCTIC PROGRAM (USAP)

The FY 1987 Budget Request for the U.S. Antarctic Program is $117.0 million, an increase of $6.8 million or 6.2 percent over the FY 1986 Post G-R-H Current Plan of $110.2 million. A budget base transfer of $14.4 million to the U.S. Coast Guard for the fixed costs of icebreaker support will take place in FY 1987. NSF will continue to budget for the incremental cost of icebreaker operations in antarctic waters.

Research topics to be emphasized in FY 1987 include atmospheric chemistry, marine ecosystems, ice dynamics, and geologic structure and tectonics of the Transantarctic Mountains and West Antarctica.

The Budget Request for Operations Support of $105.0 million includes funds for upgrading of the LC-130 aircraft and a start on construction of a science laboratory at McMurdo Station to replace the present makeshift facilities.

SCIENCE AND ENGINEERING EDUCATION

The Budget Request for Science and Engineering Education for FY 1987 is $89.0 million, a $4.3 million increase over the FY 1986 Post G-R-H program level and $35.8 million above the New Obligational Authority provided in FY 1986. This results from the fact that $31.5 million was deferred from FY 1985 for use in FY 1986.

The FY 1987 plan is characterized by stability, particularly for the precollege level programs. They are much the same in both character and funding level in FY 1986 and in FY 1987. Support is provided for materials development, informal education, teacher preparation and enhancement, and special studies and assessments.

The Graduate Fellowships program increases $1.2 million over the FY 1986 Post G-R-H level of $26.1 million. This will provide support for about 560 new fellows and 970 continuing fellows. The stipend level remains at $11,100 and the cost-of-education allowance at $6,000.

An increase of $2.3 million is sought for the College Science Instrumentation Program. This brings the level of the program to $7.5 million.

CONCLUSION

Mr. Chairman, I hope that this overview provides a sense of the problems we are facing and the strategy we have chosen to address them. We are encouraged by the budget request level that the President has sent forward. We, of course, believe that science and engineering are keys to the future well-being of our country. I hope that the final action taken by the Congress on the National Science Foundation's FY 1987 Budget Request will help us ultimately to provide those keys for the Nation, and we ask for this Committee's support toward that end.

STATEMENT OF
DR. ROLAND W. SCHMITT
CHAIRMAN, NATIONAL SCIENCE BOARD
SUBMITTED TO THE SUBCOMMITTEE ON HUD-INDEPENDENT AGENCIES
COMMITTEE ON APPROPRIATIONS
U.S. SENATE
ON THE FISCAL YEAR 1987
NATIONAL SCIENCE FOUNDATION BUDGET REQUEST
MARCH 5, 1986

My primary message is that academic research and education are central to the Nation's economic and defense strength. The international competition of the past decade has been waged, and will continue to be waged, on technological grounds. Our industries that have been surpassed have been surpassed by more advanced technology. Those running neck-and-neck with the competition, such as the semiconductor industry, will only stay that way if they keep pace with foreign technology. And those that are still ahead, such as the computer, aircraft engine, and plastics industry, are ahead because their technology is ahead. It is true that other factors play heavily in the competitive equation. And it is true that we must have a level playing field. But on a level playing field, technology is the distinguishing factor. And when the field is not level, technology is the offsetting factor. If we are to win in international competition, it won't be on the basis of cheaper labor, or cheaper capital, or a favorable exchange rate. It will be on the basis of technology.

From an industrial perspective, by all means the Federal Government must strive to level the playing field. But, just as importantly, it must make the investments in the basic resources needed by industry and defense to win in international competition. Many of the requirements for success lie with actions that only industry can take--streamlining operations, foresight in investment, commitment to R&D, creativity in marketing, and perhaps above all else, the ability to move quickly. But industry also needs two things that it can't produce on its own:

- Scientific and engineering talent
- Fundamental scientific and engineering knowledge

These are the raw materials. Only academic science and engineering--the science and engineering base--can produce them.

Examples of the importance of the academic base to industry abound. One need look no further than the field of electronics, to such university spawned developments as silicon compilers and reduced instruction set computers. Most of chemistry, materials science, solid state physics, biochemistry and computer science are so integral to industrial technology that the distinctions between basic and applied research are becoming even more blurred. And in many areas of engineering research, fundamental research issues--for example, in geometric modeling and analyses, in artificial vision, in motion control, in expert systems--are essential to the design of new products and processes.

Yet, despite the importance of the base to competitiveness, the strength of the U.S. academic research and education base shows signs of wear. The symptoms abound:

- in outdated research equipment
- in obsolete and inadequate research facilities
- in declines over the past two decades in the number of graduates receiving Ph.D.°s in key fields of science and engineering, and in a concomitant increase in the number of foreign national Ph.D.°s
- and in the decline of science and engineering education across the board.

The agenda, not merely for the Federal Government, but for all of us--for industry, for universities, for the states--is large and growing. But it must be met, unless we are willing to cede our technological leadership to others.

That brings me to the National Science Foundation and its budget for FY 1987. The NSF accounts for a very small portion of the federal R&D budget, less than 3%. But in the context of international competitiveness, it is a critical, high leverage component of the federal budget. It is the one component of that budget directly and entirely concerned not with the pursuit of government missions, but with the strength of academic research and education. It may be the smallest component of the federal R&D budget, but from the perspective of competitiveness, it is the most important. This is the context in which the FY 1987 budget proposal should be judged.

The President is proposing an 8% increase for the Foundation and is also proposing real growth in government-wide support for basic research. In the physical sciences and engineering, the increases are even larger. In light of the severe budget constraints that we are operating under, this increase reflects Administrations continued commitment to the strength of the base. In the context of the budget constraints, the increase is substantial. But in the context of the importance of the science and engineering base to the Nation's competitiveness, and in the context of the growing signs of strain in that base, the increase is also essential.

This year's proposal puts a strong emphasis on four major areas--biotechnology, computational science and engineering, global geosciences, and broadening participation in science and engineering.

Each of these areas significantly affects the health of the science and engineering base. The first three of these strengthen the base at key points of leverage, where major new advances in knowledge are possible, and where the economic effects on important industries are likely to be substantial. The fourth will help build the base by helping to ensure a sufficient supply of high quality scientists and engineers for our future work force.

Each of these emphases crosses disciplinary lines in many ways, and involves many of the Foundation's individual programs. Such cross-disciplinary efforts are important, because it is often at the intersection between old fields that the greatest promise lies.

Each will also foster still more cooperation between universities and industry, and that, too, is part of the solution we are looking for. Both sides benefit when each gains the perspective, experience, and resource of the others.

Thank you for the opportunity to submit this statement.

SCIENCE EDUCATION

Senator GARN. Thank you very much, Mr. Bloch.

In listening to you talk about science education, when you talk to this chairman and this subcommittee, you are really preaching to the choir. In the areas of science education and basic research and development, I happen to think we have shortchanged ourselves. If it doesn't affect us tomorrow or next week, it may take 5 or 10 years down the road till we realize that we have not done what we should have done earlier.

I am particularly concerned about science education in this country. The charts that you point out certainly are true from my own experience; I think if anything, they are conservative. We are dropping dramatically behind the Soviet Union in the training of engineers, of scientists, as well as Japan, and some other countries. I am not sure how we redress that imbalance.

It isn't just a matter of money; it is try to encourage more people to be engaged in these areas. I am not trying to knock all the new wonderful classes we have developed in the schools of this country that didn't exist when you and I went to school, and we seemed to manage without all of the life adjustment classes. Maybe you are not well adjusted. [Laughter.]

I don't know. Maybe that is the problem with the world today, we didn't have the advantage of some of those great classes they now teach.

But somehow, we have got to encourage a lot more teachers. I know of one situation in a high school where I went to back-to-school night to listen to the teacher talk about chemistry, and afterward, I went up to review my son's grades, and he said to me, "Well, I must admit that I'm not a chemistry teacher; I'm a math teacher. I just read four or five chapters ahead of the kids."

It is a little bit difficult to encourage young people to get engaged in those types of areas if we can't encourage enough teachers to take those classes so they are trained in the area that they are attempting to teach.

So this is one of the things that I certainly hope that I can have some impact on as a result of my space flight and working with the Young Astronaut Council, totally apart from the issue of money, of motivating more people, and using space as a carrot.

That is what disturbs me about some of the people who have gotten Ph.D.'s, and you wonder where they got them or what that educational value was when they only talk in terms of, we should have unmanned space flight and it is more expensive to put men into space than expendable launch vehicles [ELV]. Well, of course it is.

You are looking at it only in terms of launching satellites; there is no doubt about it. For a third to a half, you can put up a satellite in an ELV, and you don't need to send up a shuttle, and you don't need to have people there.

VALUE OF TRAINED EDUCATORS

But they are missing a point there and I don't know why they cannot understand. The impact I have had as an untrained educator on schools across this country has been rather amazing to me. I am still surprised at all the controversy now, not only over manned space flight in general, but whether civilians should go and particularly, in regard to the Christa McAuliffes of this world. Christa was not only a volunteer, but she was one of 11,000 teachers in this country who wanted to go.

No one has ever been drafted to go on a shuttle; nobody went without understanding the risks, and all those people out there still want to go. Every one of those 11,000 teachers want to go. But I suppose these naysayers are the same that would have been standing on the beaches of Portugal telling Columbus not to go. They still have their cards and are original members of the Flat Earth Society.

I think that you cannot quantify the value of a trained educator like Christa McAuliffe, if she had the experience that I was able to have, and come back and spend it in the schools of this country. The impact that she could have had on tens of thousands of young people, you can't put a dollar value on that. The naysayers of this world, why they can't see that? I don't know; I really don't understand it.

I didn't mean to lecture on this topic, but there is an unquantifiable value of having men and women in space. You simply cannot place a dollar value on that.

If you only save five kids, you get them back in school, if you only encourage ten engineers, it is hard to put a dollar value on that. I can't. It is not only hard, I can't. But I really believe that Christa could have had an incredible impact in this area all across this country because of her training as an educator and the way she would have been received in the schools of this country as she worked for NASA.

I want to say that I hope we don't lose sight of that fact. It is obviously difficult, what we are dealing with right now, particularly with Gramm-Rudman, when we have exempted so many programs and we are not willing to solve this problem across the board with everybody sharing in the solution. Then we obviously put a great deal more pressure on certain programs that didn't have the political popularity to be exempted.

So obviously, we are going to face some difficult times. To some, it is hard to justify that housing and this subcommittee is continuing to receive cuts while NSF gets an 8-percent increase. The same people don't mention that in 1980 the housing budget was 30 times what we spent on science in this country and to put various parts in our bill in the proper relationship.

BUDGET CLIMATE

But, nevertheless, we are going to have to face the facts that that is what Congress is doing, not making value judgments, but being very political and hiding behind automatic budget cuts, not having the courage to look at individual items and make some value judgments for the future.

So we are going to have a difficult time with your budget. There is no doubt about it. But certainly, we will do the best we can, recognizing what we are doing in particular, shortchanging the future very dramatically if we are not able to continue.

Let me ask you, in looking at the relative funding over the years, 5 years ago funding was $1 billion; which is $1.5 billion, at the current level, and there is a $1.7 billion request for 1987. All of that shows what appears to be rather dramatic increases.

NSF BUDGET LEVELS

Can you put that into perspective for us in terms of purchasing power and what we are proposing to do with $1.7 billion, with $1 billion 5 years ago?

Mr. BLOCH. Yes. I will be glad, Senator, to put that in perspective.

First of all, let me say one thing. I have looked at the National Science Foundation's budget going back about 20 years, and it's kind of startling that if you express it in current dollars, while there have been large increases over that period of time—you mentioned the increases in the last 2 or 3 years—while there have been large increases, I have got to say that the budget in constant dollars has stayed constant.

There has been a lot of dynamics within the budget, but we can't walk away from the fact that we have stayed constant at a point in time when doing education and doing science and doing engineering is an increasingly costly proposition. That has nothing to do with inflation per se. That has to do with research itself and the dynamics of research.

Let me just continue with a couple of examples to make that particular point. About 10 or 15 years ago, the Foundation spent about 5 percent of its research and related dollars on instrumentation. Today, we are spending about 16 or 18 percent. That is a significant increase. Instrumentation is getting more complex; getting more costly. The dependence on instrumentation is higher. Some of the scientists who in the past could get away with simple instruments as in chemistry, today need very sophisticated equipment to push the frontiers, No. 1, and get the benefits that we need to get out of it.

So that has happened. Therefore, again, this constant dollar, constant funding of NSF is something that we cannot live with because of this increase in the cost of doing research.

The second thing that has happened in NSF over the last few years. Our focus has been increased on engineering. We played a very minor role in engineering 10 or 15 years ago. Today, engineering research is what I am talking about and engineering education, we are playing an increasingly important role in this area. As you know, and as I have pointed out before, economic competitiveness not only has to do with science and pushing the frontiers of science, but pushing the frontiers of engineering. So we have taken on an additional mission.

The whole area of education, as you know, has been expanded. The Education Directorate has been reestablished in the Foundation in the last couple or 3 years, and that puts an obligation on us, and rightly so, not only to address precollege education, but we are also trying to get more involved in undergraduate education, where we have not played as big a role as we should have.

So we are taking on additional missions and activities. I think that has to be taken into consideration when we talk about the dollars that are being sought.

Senator GARN. Senator D'Amato?

Senator D'AMATO. Mr. Chairman, let me commend you for your dedication, not only as the chairman of the committee, but particularly as it relates to this most important area which now is under tremendous scrutiny. In terms of our National Science Foundation, and the investments in dollars that we make, they pay great, great dividends. I support you in your endeavors to see that the funds are made available to whatever level you feel appropriate or to whatever level you feel that we can obtain, because I know that you feel as I do that these dollars are well spent.

PREPARED STATEMENT

I would ask, Mr. Chairman, that I be permitted to submit a full statement as if read in its entirety for the record.

Senator GARN. Certainly.

[The statement follows:]

STATEMENT OF SENATOR ALFONSE D'AMATO

Mr. Chairman, I am pleased that you are holding this hearing on the fiscal year 1987 budget for the National Science Foundation.

The National Science Foundation budget shows increases in civilian basic science and engineering research and education activities. This reflects the administration's continued commitment to U.S. technological advancement and achievement. I believe that it is essential that we continue to heighten our Nation's scientific and technological capabilities; it makes this country stronger and more prosperous. The National Science Foundation's focus on research and development adds to our mission of scientific advancement.

If we are to maintain a competitive edge in the sciences, it is vitally important that we not only focus attention on our universities, but on precollege programs as well. NSF has taken a role in the development of initiatives to address this concern which is expressed in their previous activities and in the fiscal year 1987 budget.

NSF's fiscal year 1987 budget request shows an increase of 15.6 percent over fiscal year 1986. This will allow researchers to continue to tackle scientific questions and to make long-term investments in scientific research. The request for Science and Engineering Education [SEE] is $89 million, which is $1.95 million over fiscal year 1986. In addition, NSF has placed special emphasis on several programs for fiscal year 1987. Included among these programs is an interest in broadening participation in science and engineering research and education. NSF proposes to focus on special assistance to our States. The latter proposal is of special interest to me, and I look forward to hearing more about the particular States in need of assistance.

Computer graphics technology is an emerging advanced technological field of research and development. The benefits of this technology to the United States is enormous; it has the potential to provide scientific, defense, and economic benefits for our Nation. Thus, I look forward to hearing whether NSF plans any initiatives in the field of computer graphics research and development. We must make programs available for further development of equipment, infrastructure, instrumentation, and facilities.

NSF's notice to presidents of universities and colleges and heads of other National Science Foundation grantee organizations of February 13, 1986 (Notice No. 100), authorizes the reduction of up to 10 percent in new awards, amendments, and renewals of continuing grants, contracts, and cooperative agreements. Some of NSF's grantees will be reduced by up to 10 percent, but some programs will be unaffected by the sequester order. NSF's notice also specifies that a number of proposals worthy of support may be declined in order to make reductions mandated by the sequester order. I assume NSF gave careful consideration to this notice and I look forward to knowing more about how NSF will assist grantees that were expecting a particular allocation, but, instead, will not be funded.

Science, engineering, and mathematics research and development is crucial for the continued development of our great Nation. Thus, NSF has a unique role to play in facilitating this mission. The fiscal year 1987 budget proposal is a step in that direction.

Mr. Chairman, I have a few questions concerning the National Science Foundation which I will submit for the record.

Thank you, Mr. Chairman.

INDUSTRY PARTICIPATION IN FUNDING SCIENCE

Senator GARN. Senator Abdnor?

Senator ABDNOR. Thank you, Mr. Chairman. I would just like to echo what the Senator from New York has said. I know you will do your very best to adequately fund the National Science Fondation under the circumstances confronting us. I know how strongly you believe in this.

I was just wondering, I noticed you have about 2,000 colleges and universities and industrial firms participating in this program. In industry, how does that work?

Mr. BLOCH. I am sorry; the participation of industry, Senator?

Senator ABDNOR. Yes.

Mr. BLOCH. It works in a number of ways. First of all, as you know, we have a program, the Small Business Innovation Research Program, which is a mandated program by Congress which links universities or individual investigators, if not whole universities, and industry together in an attempt to research a particular area that later on can then be the basis of a new enterprise. So we are spending a large amount of our dollars in that particular area.

That is one way that industry participates. A second way that industry participates, we have some programs in the Engineering Directorate where we are, again, linking universities and industries to research a particular area under the guidance of the university, but with the participation of industry.

A third way which is very important, many of our programs are asking for industry participation in terms of matching funds. We want to essentially leverage the dollars, the taxpayers' dollars through industry contributions.

Let me give you a couple of examples. We had a program—and we are going to have it in 1987 also—that provides instrumentation to undergraduate laboratories, and we are asking for a 50–50 match, 50 cents coming from the Federal Government and 50 cents coming from industry, to man or essentially fulfill that particular program.

Last year, we had very good successes. We got more than a 50–50 match from industry. We got 65 cents against our 50 cents. Some of the programs, like the Presidential Young Investigator Program, which is a program that is trying to attract and keep young faculty in universities, and as you know very well, Senator, we have a shortage in many of our faculty areas.

This program is trying to keep and attract young people to faculty positions. We are asking industry to match Federal dollars on a 66–33 kind of a split, 66 cents from the Federal Government and 33 cents from industry, and we have been very successful in that particular program.

A third one is the engineering research centers, where the stipulation is that industry must participate in the center, either furnish the people or the equipment or dollars or just know-how, or the problem statement so that we can facilitate the transfer of information from the university and the fruits of university research into the industrial sector.

So we are involving industry in different kinds of ways.

Senator ABDNOR. When industry develops some new innovation, is this public information?

Mr. BLOCH. This is public information, and thank you for making that point. I should have made it myself. It is very important that industry has a good, basic knowledge base on which it can build in terms of its products and its developments. It is the basic research that we are supporting, which is available to everybody and which is available to anybody who has an interest in it.

I think the differentiation comes about when industry takes that basic knowledge and then uses it for its own purposes. A particular company does one thing with it; another company does another thing with it. So we are not interfering with the competitive aspect. We are way ahead of where the competitive aspect dominates, and there still can be competition in the marketplace, even, so there is common sharing of research information.

Senator ABDNOR. Thank you.

Thank you, Mr. Chairman.

Senator GARN. Thank you, Senator Abdnor.

FEDERAL RESEARCH LABORATORIES

Mr. Bloch, a consequence of federal budgetary constraints has been the difficulty of Federal research laboratories to maintain high-quality basic research programs. Since these facilities are solely dependent on Federal support, budget cutbacks have directly impacted their efforts.

These facilities, however, can provide the institutional framework and program continuity to best address certain types of long-term basic research needs. As an example, it has been suggested to me that the Federal Government ought to establish a basic research lab on automation and robotics because it is so difficult, if not impossible, to assemble and maintain the large interdisciplinary organization needed to approach this need through individual research grants.

Additionally, industry, which is looking for technologies which can be quickly developed and applied, doesn't have much interest in providing such an effort with very long term support. Has NSF given any consideration to this sort of an approach?

ROBOTICS

Mr. Bloch. Yes. We have given thought, not exactly in the way you are describing it, but similarly. First, let's focus on the area of robotics for a minute.

We have a number of programs that we are funding in the robotics area through the Engineering Directorate, and also through computer sciences, because robotics, as you know, merges artificial intelligence and mechanical engineering together in a very dependent kind of a way.

Senator Garn. I might suggest to you that if you want to study artificial intelligence, you might examine the Congress. [Laughter.]

Mr. Bloch. Mr. Chairman, that is not what I had in mind. [Laughter.]

So that is one point.

Second, you should know that the engineering research centers that we established last year, at least a couple of them, are looking at and are doing research in the robotics area. The University of California in Santa Barbara is looking at robotics as the main centerpiece of their effort, the application of robotics in an extra clean environment, like space, for example, or in the medical profession, in operating rooms, and in industry, where cleanliness is of vital importance. Another center, the Purdue one, is also concerned with robotics.

So we have a couple of engineering research centers that are focusing on robotics. We have also an effort in one of the engineering research centers to look at the systems approach or systems research, which, again, has a bearing on the robotics area, though you won't find a program in the Foundation that does exactly what you were describing.

But if you look around the Foundation, you will see, as I mentioned, that we have established, a number of groups that are working in the robotics area, and a number of individual investigators that are concerned with this particular area. It is a fairly significant amount of money that we are spending.

GEOGRAPHIC DISTRIBUTION

Senator Garn. The distribution of NSF's resources from a geographical point of view has been a topic of discussion for some time. Are you satisfied that NSF has been adequately sensitized and looking at the concern over nationwide development of science and technology and that your awards reflect this need?

Mr. BLOCH. The answer to your direct question, am I satisfied, is no, I am not satisfied. But I am satisfied that we are adequately sensitized to it. Today is not the first time that question has come up. We have gotten that question over the last few months, both in hearings and outside of hearings. We have, I have, taken it very seriously, and I believe while we are not as good as we should be in some people's eyes, we are doing better than what certain people maintain.

Senator GARN. When I talk about geographic distribution, obviously, you can't have even a relatively even geographic distribution across the country because of where people are and facilities to do certain things.

All I am concerned about is that we don't have an undue concentration in one area, because there are facilities around the country that are very good and that could be doing certain things.

So again, when I talk about geographic distribution, I am not talking about quotas of *x* numbers for this State and that State or anything like that.

Mr. BLOCH. No, I appreciate that.

In fact, let me show you, and I think we have some charts here that I can run through with you that make exactly the point that you are making. It is interesting. If you turn to the first chart, that is exactly the issue that you were just citing, Mr. Chairman.

[The information follows:]

NATIONAL SCIENCE FOUNDATION ANALYSIS—GEOGRAPHIC DISTRIBUTION OF AGENCY FUNDING

The following charts are all based on the relative distribution of 1983 R&D funds of the National Science Foundation. The measure chosen to distribute these funds differs; the first two are commonly used to measure the relative equity of NSF's funding patterns against some standard other than science. The fourth, and last, is a presentation of the impact of NSF's standard for research excellence on its funding distribution. The third, the number of scientists and engineers, is an attempt at a halfway measure.

The substance of the analysis displayed by charts 2, 3, and 4 is that when viewed against a number of different, but significant parameters, the distribution of NSF funding is clearly more equitable than chart 1 would lead one to conclude. The data on charts 2, 3, and 4 show that almost half of the States exceed or meet the average funding level indicated. Further, in many of those States where funding levels are significantly below the average, NSF is making a concerted effort to assist in the improvement of the scientific and engineering research and education infrastructure through such activities as the experimental program to stimulate competitive research and enhanced support levels for undergraduate institutions in both the research and education activities of the Foundation.

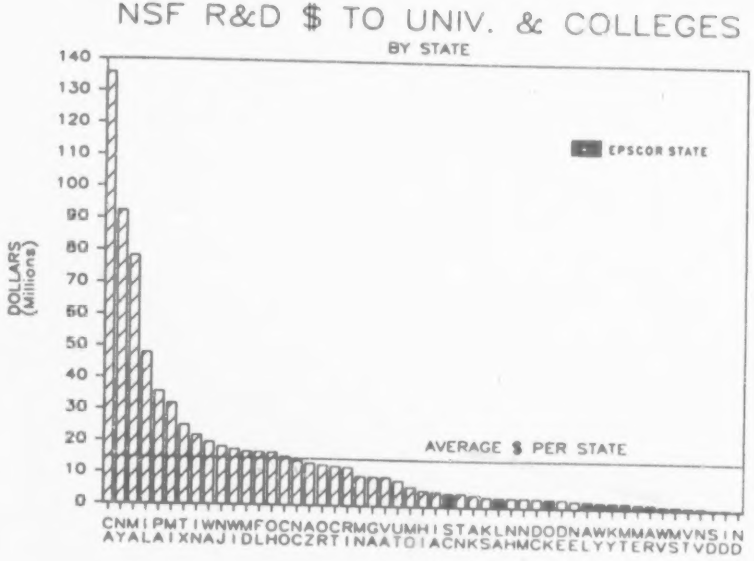


CHART 1

NSF R&D FUNDING TO UNIVERSITIES

AND COLLEGES BY STATE

- o States are arrayed in order of receipts of 1983 NSF R&D dollars to universities and colleges.
- o California, New York, Massachusetts, and Illinois are the high recipients.
- o EPSCOR states represented by solid bars.

SOURCE: National Science
Foundation Feb. 1986

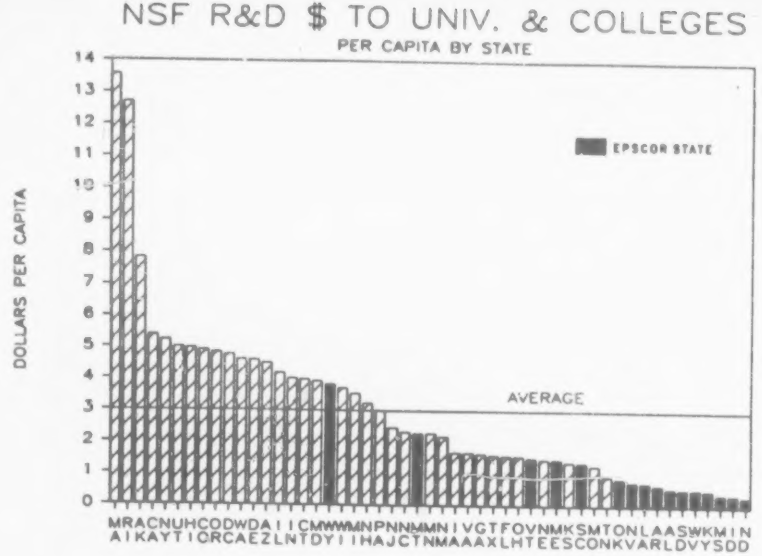


CHART 2

NSF R&D FUNDING TO UNIVERSITIES

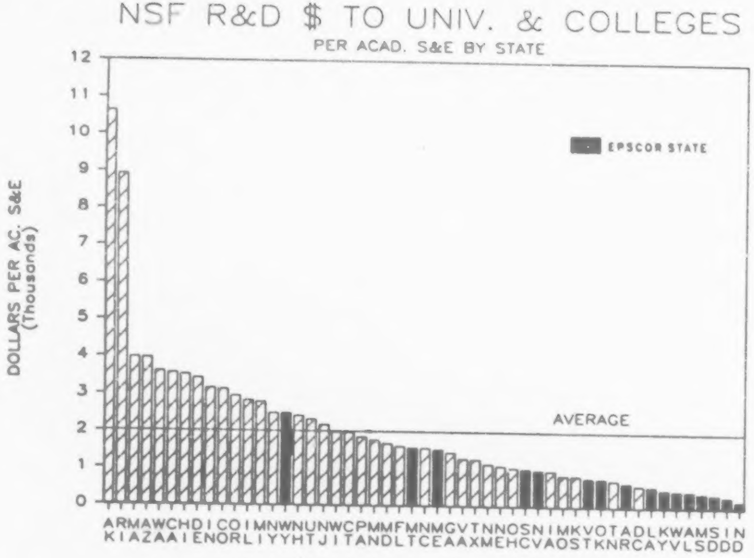
AND COLLEGES PER CAPITA

BY STATE

- Same NSF funding data divided by each state's population. Plotted in in descending order of per capita state funding.
- The high states are Massachusetts ($13.56/capita), Rhode Island, Alaska, California, New York, Utah, and Hawaii.
- States represented by solid bars are the states being assisted through EPSCOR.
- Twenty-two states exceed or meet the average including such states as Delaware, Arizona, Wyoming, and New Hampshire.

SOURCE: National Science
Foundation Feb. 1986

CHART 3



NSF R&D FUNDING TO UNIVERSITIES

AND COLLEGES PER ACADEMIC

SCIENTIST AND ENGINEER

- NSF R&D funding divided by the number of academic scientists and engineers in each state, arranged in descending order.
- The high states are Alaska, Rhode Island, Massachusetts, and Arizona.
- States represented by solid bars are the states now being assisted through EPSCOR.
- Twenty states exceed or meet the average including such states as Colorado, Minnesota, and Utah.

SOURCE: National Science
Foundation Feb. 1986

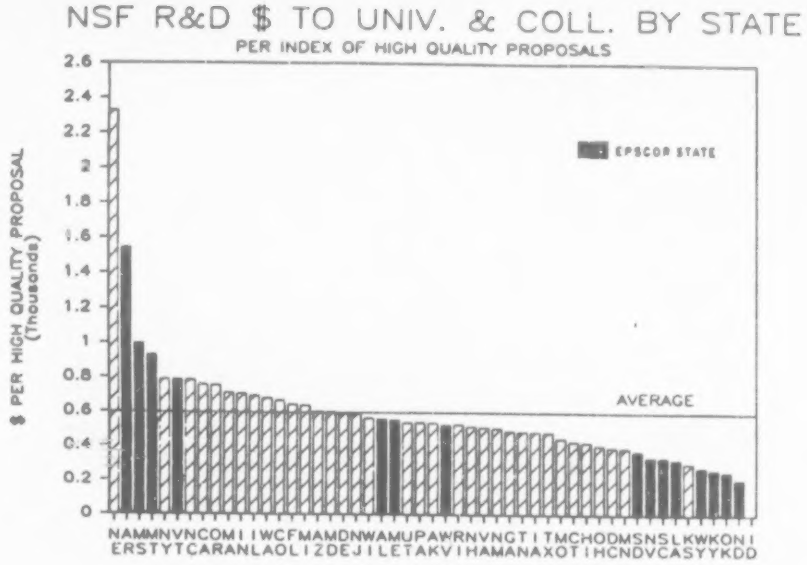


CHART 4

NSF R&D FUNDING TO UNIVERSITIES AND COLLEGES DIVIDED BY NUMBER OF HIGH RATED PROPOSALS PER STATE

(PROPOSAL QUALITY INDEX)

- NSF R&D funding per state divided by a sample of high rated proposals from each state in the years 1980, 1981, and 1982.
- The chart shows that, in general, NSF's allocation of R&D obligations to academic institutions is proportional to the highly rated proposals coming from a state.
- States represented by solid bars are the states being assisted through EPSCOR.
- Nineteen states exceed or meet the average including such states as Nebraska, Arkansas, Mississippi, Montana, Florida, and North Carolina.

SOURCE: National Science Foundation Feb 1986

If one just takes the R&D dollars of the National Science Foundation and divide it by the number of States, one gets a lopsided curve, as you can see, where one has very high peaks like California and New York on the left hand of your curve, and then you have practically nothing as you go to North Dakota and similar States.

The picture is a little bit different if you turn to chart 2, where I am showing the National Science Foundation R&D dollars on a per capita basis by State. So the total R&D dollars is proportional to the number of people in the State. You can see that is a more rational distribution.

Still, it falls off in the middle of the chart below the average. By the way, the States which are black colored in here are called EPSCOR States and are essentially States that we are focusing on specifically through the EPSCOR Program in order to bring them up to a more acceptable level of scientific and engineering performance.

So we have our focus on that, and that is one of our programs, as it has been in the past. It is one of our programs in 1987. Essentially, we are spending quite a bit of effort and quite a bit of dollars in that area to bring those States up to par.

If you turn to the next chart, chart 3, this eventually takes the R&D dollars of the National Science Foundation proportional to the academic science and engineering population of the State. Because you need scientists and engineers to do the research if you want to do research. As one can see, the things now are spreading out along more equal treatment basis.

Last but not least, if you turn to the last chart, this uses the index of high-quality proposals that we received over the last couple or 3 years, 1980, 1981, and 1982, and divide that into the R&D dollars. You see, obviously, that if you look at the excellence of the proposals, it distributes even more equally.

The point I want to make is that the second and the third chart—namely, the per capita by population or by academic science and engineering people in the States—is a better indication of how well or how poorly we are doing than just dividing the budget by 50.

We are dedicated to making sure that we can keep that in focus. Many of the programs that we have in this particular budget are aimed at that, and I mentioned the broadening thrust before as one major kind of initiative.

STUDENT EDUCATION IN UTAH

Senator GARN. That is helpful, to see the different ways of distributing that. I am fully aware how easy it is to look at one set of statistics and provide a biased viewpoint.

I constantly hear about my educational system in my State, that we are 51st in terms of the dollars spent per student on education in this country.

The other statistic that gave me a rather different picture is that we spend a higher percentage of our total income on education than any other State in the country. The disparity is that we have big families. We have lots of kids. I am not going to add to that. Seven is enough. [Laughter.]

I am not going to add No. 8. But you see, it gives two different pictures. On the one hand, we show the greatest educational effort in the country. As far as your tax dollars and as far as per capita, we are the lowest. So I understand what you are saying with the charts.

Mr. BLOCH. May I make just one more comment on this point? If you look at charts 2 and 3, you see where Utah is much above average in both cases, whereas on the first chart, obviously, it is somewhere on the right-hand side and below average.

Senator GARN. I was very well aware that in the second footnote that Utah was there. [Laughter.]

Mr. BLOCH. I didn't want to lose the point. [Laughter.]

Senator GARN. Those four letter words stand out. [Laughter.]

That is another thing I used to have put up with, four letter words. When I was mayor of Salt Lake City, Jake Garn is mayor of Salt Lake City, UT, all four letters words.

BASIC RESEARCH IN INDUSTRIAL NATIONS

You observe that the United States, contrary to to other countries, places high emphasis on basic research and academic institutions. By contrast, Japan has very successfully employed the approach of a more vigorous precollege education program coupled with a significant investment in R&D research in industry.

Do you see Japan and other industrial nations shifting more of their efforts toward basic research and academic institutions?

Mr. BLOCH. Yes, especially Japan has recognized that if one gets into a position of leadership, as they are getting into in many of the areas, that one cannot depend on other countries to always give you the basic research results. Therefore, you have to create these results.

As you know, the precollege system in Japan is extremely good. The college system is less so, in particular, when it comes to research. There is just no history, no tradition of research in universities and the coupling of that to industry. Japan is trying to rectify that particular situation.

So we can see a big push, I believe, on basic research in terms of Japan and we should take that, also, into account when we talk about competitiveness. Besides economic competitiveness, there is such a thing as research competitiveness, and we better be prepared for that.

NSF AND DOED EFFORTS IN SCIENCE EDUCATION

Senator GARN. Senator Weicker wished to be here today, and he couldn't. But he has concerns, and I do, too, on the committee, in reviewing overall Federal efforts on improvement in education. He has begun an analysis in the Department of Education activities in the area of science and mathematics. Questions have been raised with respect to the differing orientation approaches and methodologies between the NSF effort and that of the Department of Education.

Could you explain to us the differences between your approach and the Department of Education's?

Mr. BLOCH. Yes, I would be glad to comment.

Senator GARN. Also, if you could comment on what efforts you are making to coordinate activities?

Mr. BLOCH. Well, the first thing I wanted to mention is that our budget, our total budget, compared to that of the Department of Education, is minuscule.

Second, if you look at the part of the budget that we are dedicating to education, it is about $89 million. That will allow us, really, only—and it is very important—to focus on leadership activities such as demonstration projects, on setting examples, essentially, rather than blanketing the whole education area, which is a $200-billion-plus business.

So we have to be very selective of what we are doing, and we have to put programs in place that are essentially giving us maximum leverage and the end results of which can be spread throughout the country. So that has been really our focus in the precollege area—namely, the focus on teacher enhancement; focus on materials development; and then, focusing on networking within the teaching profession so that we get maximum benefit.

That is different from the Department of Education. They have an entirely different approach.

Second, in terms of cooperation, we have been working with the Department in a number of areas, especially in the informal education area. We are jointly sponsoring a new series concerning mathematics.

You should also know that in the last few weeks I have made a special effort to visit Secretary Bennett and his staff, together with Dr. John Moore, the Deputy Director of the Foundation, and Dr. Shakhashiri, who is the Assistant Director of the Science Education Directorate, and we sat down together to see what we can do to help them improve both their relations with the appropriate communities and their staffing capabilities.

Dr. Bennett has a very great desire to improve the mathematics and science part of his effort. The Department lacks, however, the Foundation's ties to the academic science and engineering community. We can help in this particular area in a number of ways.

First, we are in that field. But more importantly, we have access to scientists, engineers, and teachers that he probably does not have accesss to. NSF can help the Department in that respect.

We are working with him in this particular area, and also, in many other things that he wants to pursue.

His focus is on excellence, as it should be, and he mentioned, when we talked to him, he would like to make sure that in this one area of mathematics and science, the Department has as good a reputation as NSF has. With the appropriate efforts, NSF can help him achieve that goal.

We are working closely with him. We have common programs together, but we have a different approach, no doubt about it, because of our mission, No. 1, and also because of the financial difference of what he has at his disposal and what we have at our disposal.

Senator Leahy?

Senator LEAHY. Thank you, Mr. Chairman.

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH

Dr. Bloch, it is good to see you again. I enjoyed our talk in my office. I am sorry the matter over at the Intelligence Committee has kept me from being here.

Many of us are concerned that, as I mentioned to you before, that too many of our extremely scarce Federal research dollars are going to only a few universities. I understand the reasons why this situation exists. That is what made me so excited about the EPSCOR Program, which would help a State like my own be more competitive in basic research.

Vermont is now one of the fastest growing high-tech States in the Nation. I know that this year, now that Vermont has prepared the EPSCOR 5-year plan, it will become much more competitive.

I am wondering if there will be enough funds in the 1987 budget so that these States, including Vermont, can go beyond planning to actually operating programs.

Mr. BLOCH. To answer your question directly, Senator, that is our plan, but it obviously depends on how well we fare in Congress in our budget request.

But we have the plan of selecting 8 out of those 12 in a competitive kind of a way, out of these 12 States, and start funding them in 1987 at $750,000 a year per State.

Obviously, the State has to put some money into it also, and they are committed to doing that.

Let me tell you just one thing: We had to go through, in the last few days, a 4.3-percent cut because of the Gramm-Rudman situation. Because of the need in this area, we protected EPSCOR. We are not taking any money out of EPSCOR.

Senator LEAHY. I am glad to hear that, because our own State has committed about $1.5 million to this program, which probably doesn't seem like a lot of money if it comes from a large State. But from a State of only a half a million people, that is a great deal of money Can we expect that the National Science Foundation is going to be committed to this program over the next 5 years? Because we are making, in our State, a major commitment to this program.

Mr. BLOCH. Yes, yes; it is our intent to protect this particular area. Let me, since you brought up this particular subject, let me make a more general comment on Gramm-Rudman and the effect of it in 1986. We have been protecting not only EPSCOR. We have been protecting, in general, people that we are supporting. For instance, we didn't take anything away from the stipend for graduate fellowships or the number of graduate fellowships. We have taken away from the educational allowance, which doesn't make the universities very happy, but on the other hand, we are not losing people in the process.

We have been protecting some of the minority programs and the women programs in the same sense. So we have tried to protect areas like EPSCOR and areas that deal with people, to the detriment of something else.

PRIORITY SETTING

Senator LEAHY. Mr. Bloch, I might say that whether any of those programs protected Vermont or not, I concur absolutely with your judgment and with your priorities. I don't envy you or anybody else at a time of tightening budgets to set those priorities. I think you have set the best ones. Again, whether those were funds that have come to my State or any of the other 49 States from a national perspective, I think those are the right priorities, and I commend you for it.

Mr. BLOCH. Thank you.

SUBMITTED QUESTIONS

Senator GARN. Dr. Bloch, I have more than 10 pages of additional questions I would like you to respond to in writing, but we won't keep you here on the hot seat to answer them orally. But we thank you very much for your testimony and the good job that you are doing at NSF. Thank you very much.

Mr. BLOCH. Thank you.

[The following questions were not asked at the hearing but were submitted for response for the record:]

QUESTIONS SUBMITTED BY SENATOR GARN

OPTIONAL ADDITIONAL OPENING REMARKS

NATIONAL SCIENCE FOUNDATION

Some have pronounced the President's fiscal year 1987 budget "dead on arrival". While this makes for good political copy, it does not have very significant impact on those few programs which this Administration views to be of high priority. This concern is referred to as Gramm-Rudman-Hollings, which, in the absence of positive action to restrain Federal spending to prescribed levels, mandates "across-the-board" reductions from previously established levels. In the case of NSF, this would mean that not only would requested increases be ignored, but also further budget cuts be taken from the base amounts to which you wish to otherwise increase ... A double cut from the President's request.

Under this scenario, not only would you be denied your 10% increase in research funding, but you may end up trying to figure not how to reduce your FY 86 levels by up to another 15%.

Even more egregious is Science and Engineering Education where the impact of a "freeze minus" on appropriated levels would effectuate a 40% reduction from current program levels.

Question: In your view, is this an acceptable level of program support?

Answer: No, it isn't. A 40% reduction in Science and Engineering Education is a $35 million cut from current program levels, and would be disruptive to the stability and continuity we have worked hard to establish in that area over the last three years. Only five years ago this program was nearly eliminated. After priorities were reestablished, it took us several years to bring the program back up to an effective operating level. To do that required us to carryover $31.5 million in 1984, and defer $31.5 million in 1985. Finally, in 1986, we have achieved much needed stability. Our current obligation rates are on target to spend the full $87 million available, including the $31.5 million deferral. Our programs have become more focused, particularly on catalytic activities geared to the important precollege area, and the community is responding very well. To hit this area now with a 40% reduction from current program levels-$35 million-would be very disruptive and counterproductive to our efforts over the last three years.

SCIENCE AND MATHEMATICS EDUCATION

An aspect of our Federal-wide efforts to improve the quality of Science and Mathematics Educational Program has been the focus and goal of this initiative. Your comments, and budget, Mr. Bloch, seem oriented or weighted towards the education and training of new scientists and engineers — a goal no one disputes. But beyond filling the ranks of these professional categories our society has an equally desperate need to augment general conversancy and familiarity with scientific and mathematical principals and concepts.

Technology has attempted to address this issue by concentrating on "human factors engineering" and "user friendly" considerations. It appears, however, that unless our general population becomes more attuned to technology, more educated and oriented to using technology, we will become saddled with an impossible burden of competing with more aggressive Nations.

This is an immediate concern with respect to the needs of our Armed Forces in finding recruits to operate highly sophisticated weapon systems. It is, however, ultimately more critical in strengthening the political consensus needed to continue our Nations' investment in science and technology.

Consumer demand will force industry to produce products at lower unit cost and with greater capabilities. This process, however, is dependent on the availability of technologies and scientific findings which governmental investment has yielded. Unless we can focus our society's interest in these long-term endeavors, and generate the political will to continue our investment in them, I fear our efforts may merely accelerate the point at which the shelves of new knowledge are exhausted.

Question: Do you have any comments in this regard?

ANSWER: Because of the nature of the U.S. educational systems, project support at the precollege levels improves the science and mathematics educational experiences of younger children regardless of their future career decisions. Moreover, several of our programs focus specifically on providing science literacy for students who are not planning careers in science or technology and for members of the general public. Our commitment to these goals is stated in the following quotations from two of our Program Announcements:

The Instructional Materials Development Program:

The Foundation's programs in materials development and research are oriented toward the combined objectives of preparing all students for living in a high technology society and of increasing the number of students adequately prepared to pursue higher education in mathematics, science, and technical fields.

An Objective of the Informal Science Education Program:

To provide greater and mutually reinforcing opportunities for the public to make use of the rich resources for scientific, mathematical, and technological learning which exist outside the formal educational systems.

GRAMM-RUDMAN-HOLLINGS

Question: Should the 1987 Gramm-Rudman sequestration process result in mandated significant budget reductions, in what ways would you apply those reductions to your activities?

Answer: The Gramm-Rudman-Hollings law mandates across-the-board cuts, to be applied at the line item level, and that would be our initial response. As in FY 1986, we then have to examine the impact on each program element to determine the need to request reprogramming actions.

Question: What would be your priorities?

Answer: Obviously, it is too early to predict how severe any 1987 sequestration may be, and to a large degree the severity of the FY 1987 reduction will affect our priorities.

In general, the Foundation's priorities of attracting talented people to careers in science and engineering, maintaining a proper balance across programs, and pursuing emerging opportunities in research and education will be retained. Within this set of priorities we are assessing the potential impacts of a severe sequestration in FY 1987 on people, number and size of awards, facilities, balance, and the proposed 1987 emphases. It is also likely that we would seek reprogramming action to protect high priority areas as we did in FY 1986.

DEPARTMENT OF SCIENCE AND TECHNOLOGY

Question: Mr. Bloch, do you believe that the Federal Government should establish a Department of Science and Technology?

Answer: The proposal, to establish a Department of Science and Technology, has been advanced a number of times, with a mixed response from the scientific community, within Congress and the Administration. This underlines the difficulty of judging the effect of a Department of Science and Technology on science and the government.

One should not rush into setting up a new department until there is a clear understanding of what problems need solving and what a new organizational approach can bring to the solution.

Another question that the establishment of such a "superagency" raises is which of the various agencies, or departments or sections of agencies, such a department should encompass. This needs to be approached in steps; not all at once.

The form of such a department is also important. We must be careful that we do not lose the positive effects of the pluralistic approach that exists today in Federal support for science and engineering research.

It is clear from the above that many issues need to be thought through before such a step is taken.

INFRASTRUCTURE

Much has been discussed recently concerning the state of our nation's academic research facilities.

Question: What is the appropriate role for the Foundation with respect to support for these research facilities?

Question: What actions have been taken to implement these responsibilities?

Answer: Results of surveys and analyses of academic science and engineering facilities are in agreement that universities and colleges have been spending on the order of $1 billion per year for facilities, and that unmet facilities needs are several times greater. A 1984 NSF survey was as part of the work of the Ad Hoc Interagency Steering Committee on Academic Research Facilities and identifies the facilities spending plans ($450 million annually for 5 years) of 25 research universities.

The traditional NSF role has been provision of major capital intensive research facilities such as telescopes, antennae, accelerators, and ships. These resources serve, and are under the direction of, the appropriate academic communities. A major recent extension of this support has been the creation of academic supercomputer centers. Although there is some difficulty in cost allocation, it is the case that during FY 1985 NSF applied approximately 5% of its funds to increasing the stock of research facilities, while at the same time an additional 10-12% of the budget supported operation of these facilities. Thus, on the order of 15-20% of the NSF program currently goes to the provision of major research facilities.

The Foundation recently (September 1985) reaffirmed its policies with regard to the construction and renovation of research and education facilities, and specified that all programs may consider proposals for such support. Successful proposals, must make the argument that facilities support is integral to the accomplishment of the research project. The general inclusion of facilities refurbishment as an eligible project represents a new NSF response to infrastructure needs. Under current severe resource constraints--both within and outside government--it is essential that awards for facilities support receive full scientific scrutiny.

Another NSF role has to do with financing arrangements, wherein grantees have been permitted flexibility in financing which maximizes the efficient utilization of funds through various debt and leasehold arrangements. NSF also has been urging a revision in OMB indirect cost procedures toward greater flexibility in facilities depreciation.

The need for support and for careful delineation of the problem continues. NSF now is required to set up a data collection system and to report biennially to Congress; the first report will be submitted later this year.

REORGANIZATION

In a recent letter to the Committee, you mentioned that NSF was considering two reorganization proposals. The first was a shift of Astronomy to the MPS directorate and the second involved the consolidation of scientific computer functions in a new Directorate.

Question: Please outline the status of these proposals along with a brief analysis of the considerations and advantages involved.

Answer:

Astronomy Realignment

The move of the Division of Astronomical Sciences from the AAEO Directorate to the Mathematical and Physical Sciences Directorate parallels the close association of astronomy and physics within the academic community. The Division of Astronomical Sciences move to MPS as a complete entity is planned for May 1, 1986.

The atmospheric, earth, and ocean sciences are an increasingly global and interactive set of disciplines, as evidenced by the Global Geosciences emphasis within the FY 1987 Budget Request. After the Astronomy transfer, AAEO will be renamed the Directorate for Geosciences.

Directorate for Computer and Information Science and Engineering

The Foundation has several activities in computer science, information science, computer engineering, supercomputers, and networking. Our investment in these new and important areas is growing rapidly and many of the existing projects are inter-related and support a common community of scientists and engineers. In order to assure a broad and thorough understanding of our opportunities and responsibilities, a closer linkage is called for between these presently separate groups.

The components that will be consolidated to comprise the new Directorate include:

- the Division of Computer Research (MPS),
- the Division of Information Science and Technology (BBS),
- the Office of Advanced Scientific Computing (O/D), and
- several computer-related elements from the Engineering Directorate.

The planned effective date of this reorganization is May 1, 1986.

RESEARCH CENTERS

The Engineering Research Centers program has been well received in the scientific and engineering community. The Foundation has received in the first two years of the program, a total of almost 250 proposals. Obviously there is a lot of interest in this program.

Question: What are the major areas that are touched upon by the proposals?

Answer: The Engineering Research Center competition has demonstrated that the Engineering Schools have a rich variety of interests and ideas. Characterization of the topics into a few categories has been difficult but not nearly as difficult as the selection of a few of the most promising. The characterization of this year's proposals follows and a less detailed characterization for last year is also shown.

Distribution of Proposed Research Topics
FY 1986

Topic	Number
Manufacturing	18
Nondestructive Evaluation & Reliability	4
Design for various purposes including manufacturability	8
Clean room technology for Microelectronics manufacturing	1
Materials characterization for Engineering use	3
Materials Handling (Coal)	1
Material Recovery & Recycling	1
Materials Processing, Particulate & Multiphase	7
Materials Processing, Laser and Plasma	3
Optical and Electro-Optical Engineering	7
Hazards Waste, Mitigation, & Resource Recovery	8
Waste Management Engineering	3
Environment Engineering	2
Fluids Engineering	4
Fire Protection Engineering	1
Sensors, Transducers, & Actuators Engineering	4
Information Storage Technology	1
Signal Processing and Network Telecommunications	3
Microelectronics	4
Electronic Packaging	2
Biotechnology & Biomed	5
Construction, Building & Bridge Engineering	4
Mining Automation	1
Ocean Technology & Engineering	2
Wind Engineering	1
Wood Engineering	1
Natural Gas Recovery from Unconventional Sources	1
Combustion Engineering	1
Electrochemistry	1
Total	102

Distribution of Proposed Research Topics
FY 1985

Topic	Total
Manufacturing	34
Materials	12
Chemical Processing	11
Microelectronics	11
Computers	10
Construction	8
Lightwave & Optical Tech	8
Biotechnology	7
Aero & Space	5
Particulate & Multiphase Processing	5
Ocean Engineering	5
Water	5
Fluids	4
Separation Processes	4
Energy	3
Telecommunications	3
Transportation	2
Cold Regions	1
Electronics	1
Power	1
Lighting	1
Superconductivity	1
Total	142

Question: What is NSF doing to assist those institutions who are not successful in the competition?

Answer: The Foundation recognizes the importance of encouraging engineering schools to develop center plans whether or not they are successful in the competition.

First, leaders of many engineering schools have expressed the view that the writing of an Engineering Research Center (ERC) proposal was important because the goals of the Center program are in tune with changes they are seeking in their education and research programs. The preparation of the proposal forces engineering schools to re-examine research and educational strengths and weaknesses; to establish needed cross-disciplinary faculty interactions in structuring a research agenda on an important topic; and to integrate research into graduate and undergraduate education.

In addition, the emphasis on training students in synthesizing, integrating and managing engineering systems works toward educational objectives which industrial leaders have been urging for some time. The requirement for industrial participation in the proposal has prompted institutions to focus attention on developing stronger industrial ties and to encourage in-depth discussions of both educational objectives as well as fundamental engineering research objectives important to industry needs.

Third, this year the ERC program asked for written permission to show proposals to other federal agencies, so that the probability of support beyond NSF would increase. At the same time, we also received permission from many schools to include their proposal title in lists made available to qualified companies, so that there would be greater industrial knowledge of the proposed topics.

Fourth, last spring we held meetings in Atlanta, Kansas City, Dallas, San Francisco, and Washington D.C. where those who had written unsuccessful proposals could receive general guidance and comments on the first round of proposals. About 180 engineering professors attended. The meetings were designed to be convenient to under-represented geographical areas and to be small enough for significant interaction with the NSF staff.

Finally, Cross-Disciplinary Research (CDR) staff of the Engineering Directorate have spent a considerable amount of time in discussions with engineering faculty members and assisting them in developing strategies for achieving their objectives. Much of this was done under the auspices of the ERC program. By such efforts the universities, even though they may not have been successful in the ERC competition, became more attuned to the new directions in cross-disciplinary research and education. Further, the CDR staff view this as an important and continuing responsibility in working with universities. In this connection, for example, last Spring the National Academy of Engineering held a symposium, "The Engineering Research Centers; Factors Affecting Their Thrusts." A similar symposium will be held again this year.

BIOTECHNOLOGY CENTERS

In the Biotechnology Initiative, NSF proposes to establish a number of centers and group projects.

Question: Would you describe the differences between these two activities?

Answer: There are three types of centers relevant to research related to biotechnology. The first includes the engineering research centers. These centers are cross-disciplinary and focus on research related to fundamental engineering in areas important to international competitiveness. In the case of the Massachusetts Institute of Technology center related to biotechnology, the focus is on scale-up biological production and the subsequent down-stream, product-oriented processing. The research focuses on processes and is heavily committed to engineering education and training as well as to increasing fundamental engineering knowledge.

The other two types of centers, proposed in the current budget, are not process and problem oriented but are centers of excellence in basic scientific research. The proposal for the larger centers will involve multidisciplinary research in basic biological or biochemical science without the necessity of a specific problem focus. Student training will be emphasized at the graduate and post-doctoral levels. These centers will focus on a group of loosely related projects and not on a large group focused effort.

The smaller centers suggested in the FY 1987 budget are designed to provide equipment support at a departmental level and will be awarded on the basis of the balanced strength of the group making the proposal and the possible contribution that the new equipment would make to progress in some area of fundamental biological science.

GEOSCIENCES

Question: In what ways will NSF coordinate with other Federal Agencies its activities with respect to the Global Geosciences initiative?

Answer: Policy for U.S. participation in the Tropical Oceans and Global Atmosphere program and international coordination is provided by the National Climate Program Office (NOAA) and its Interagency Policy Board. The U.S. TOGA Project Office (NOAA) is responsible for interagency coordination with regard to TOGA monitoring and data management matters. Scientific oversight is provided by the ad hoc TOGA Panel of the Climate Research Committee of the National Academy of Sciences.

The Global Tropospheric Chemistry Program (GTCP) will be coordinated through the Subcommittee on Atmospheric Research (SAR) of the Committee on Atmosphere and Oceans (CAO) of the Federal Coordinating Council for Science, Engineering and Technology. The SAR has already appointed an interagency panel for coordinating the GTCP. As the program matures, it is likely that an interagency program office will be established to carry out coordination, planning and operations on a daily basis. This is a procedure that has been used successfully in all major atmospheric science programs for the past 20 years.

NSF will use its participation in the Subcommittee on Marine Research (SMR), also under the CAO, to coordinate interagency aspects of the World Ocean Circulation Experiment, and Global Ocean Flux and Ridge Crest Studies. Ship needs for Global Geosciences projects are the responsibility of the Federal Oceanographic Fleet Coordinating Council, another component of CAO.

The Ocean Principals (the ten Federal agencies with oceanic interest) affords an informal coordinating mechanism for agency heads and senior staff. NSF has briefed this group on its ocean science initiatives and will continue to keep it abreast of developments.

Coordination of the Global Seismic Network (18 DoD satellites in six equally spaced orbital planes) with the U.S. Geological Survey and DARPA is assured by a recently signed Interagency Accord among the three agencies involved.

Coordination of Global Positioning System use for observations of tectonic plate motions and global sea level changes will be governed by an interagency agreement now being developed by NASA, NOAA, NSF, USGS, and DOD.

In cases where sites of the Long Term Ecological Research (LTER) network are located on Federal lands, coordination with the cognizant agency is necessary. Such coordination is usually carried out on a case-by-case basis.

The other component of Global Ecosystem Dynamics, increased use of remotely sensed data, requires extensive coordination with NASA. This includes jointly sponsored workshops to promote development of analytical techniques and field experiments that will use and complement ecological data derived from satellite measurements.

Informal staff contacts between NSF program officers and their counterparts in ONR, NASA, NOAA, USGS and other Federal agencies provide an important level of coordination.

In addition, NSF expects to fund many single investigators or small groups for research using global data sets acquired with other agency support. No formal interagency coordination is required for these activities.

EDUCATION DIRECTORATE

This Subcommittee has spent a considerable amount of time trying to ensure that the first order of business for the Science and Engineering Education Directorate be the emergence of a sound and focused Precollege program.

Question: What is the Directorate's current status with respect to the management of its precollege program as well as the management plan called for by the Congress in the FY 85 Appropriations Act?

Answer: SEE has taken several steps to strengthen its precollege program. For example, about 10,000 teachers were participants in NSF-supported teacher enhancement activities during the summer of 1985 and academic year 1985-86. Leadership teachers work with their peers to extend the impact of NSF support. Expecting each leadership teacher to work with 5-10 more teachers during the first year, about 50,000 teachers will be reached with these professional development activities. This is about 3.5% of the 1.4 million elementary and secondary (science and math) teachers that are program targets. Over a five-year period and expecting that leadership teachers continue to exert their influence, about 25% of the target audience (250,00 teachers) will have been reached, if the program continues to support about 10,000 teacher participants each year.

SEE is also including more narrowly defined target areas and we have invited responses to three solicitations focused on:

- the design and implementation of a program that will prepare college and university students to teach science and/or mathematics at the middle school level (grades 5 through 9)

- the development of materials to teach science to elementary school students. Emphasis will be placed on devising materials that incorporate instructional strategies designed to couple smoothly to the real world characteristics of school facilities, calendars, curricula, and teachers, and

- the development of materials to teach mathematics to elementary school students. Emphasis will be placed upon the innovative exploitation of available technology such as hand-held calculators and computers.

With respect to the management plan called for by the Congress in the FY 1985 Appropriations Act, a contract was given to the Research Triangle Institute (RTI) for a study focusing on middle school science education. The contract began in October 1985 with results and recommendations due in September 1986. The Research Triangle Institute is conducting the work in collaboration with the Education Commission of the States and the Northwest Regional Educational Laboratory. The second and major part of the study began in February 1986, with results and recommendations due in February 1987 and the results of a pilot evaluation of one of NSF's science education programs due in November 1987. The work is conducted by SRI International in collaboration with the University of Florida and Stanford University.

The purpose of the study is to assess the advantages and disadvantages of alternative initiatives available to NSF to address problems and opportunities in science education (broadly defined to include science, mathematics, and engineering), with particular attention to high-leverage, realistic programs. The study will focus on initiatives the Foundation has put in place to meet its objectives. In addition, the study will identify new initiatives, not yet in place or funded, and possible management plans which also might prove useful in meeting NSF's objectives.

The main study tasks are:

- To review the prior experience of NSF and others in funding and evaluating science education programs;

- To assist in operationally defining program objectives so that the outcomes of NSF initiatives can be realistically and clearly measured;

- To assess the advantages and disadvantages of alternative initiatives available to NSF to meet its objectives; and

- To design plans for the Foundation to evaluate, on an ongoing basis, the quality and impact of its work.

The result of the study will be an increased NSF capability to define science education program objectives, assess the initiatives taken to meet these objectives and, informed by ongoing assessment, institute necessary changes in these initiatives.

SCIENTIFIC MANPOWER

Question: Would you comment on the issue of scientific manpower with respect to the nations's needs for the future?

Answer: The prime issue is whether supply will adjust rapidly and efficiently to changes in demand. Characteristics of the Nation's future supply of scientists and engineers are important to consider, such as the number of scientists and engineers (S&E's) needed at each degree level, and the field specialties needed to best match the pattern of demand for scientific manpower.

For B.S. degrees, empirical evidence indicates that the number of graduates in the natural sciences and engineering (NS&E) combined is not very responsive to changes in aggregate demand, but that the number of graduates in social and behavioral sciences is more responsive. Within each of these categories, specialty fields are responsive to market demands. At the Ph.D. level, both the number and field composition of new degree holders appear to be responsive to changes in demand, but with a lengthy time lag. Data also show that improved employment conditions for B.S. graduates tend to reduce the number of Ph.D. candidates.

It is impossible to make accurate projections of the numbers of new degree holders that will be needed to meet future scientific manpower needs. Shortages are more likely to occur at the bachelor's level, rather than the Ph.D. level. One reason is that demand for Ph.D.s in the academic sector is likely to decline substantially in NS&E over the next 10-12 years. Total employment in science and engineering (S&E) occupations in the United States grew by 50 percent during 1976-1983, primarily as a result of very large increases in employment of BS-level engineers and computer scientists. It is doubtful that such growth can be sustained very long because of the decline in the number of college-age students from the 1980's through the 1990's. The number of college-age students has been an important determinant of the annual number of new baccalaureate degree holders in all NS&E fields combined for the past 25 years.

Question: What trends should we be concerned about?

Answer: There are three trends of possible concern: declining numbers of U.S. college students, faculty age, and foreign students.

The progressive decline in the number of college-age students started in the early 1980's and will continue until the late 1990's. Data show that demographic changes are the most important source of variation in the number of B.S. graduates in natural sciences and engineering (NS&E). Thus, the annual flow of new graduates in NS&E may diminish considerably, thereby reducing the ability of labor markets to balance future needs for scientific manpower with scientists and engineers possessing the needed skills and experience.

The progressive decline in the percentage of academic faculty in NS&E fields that will retire each year until the mid to late 1990's is a legacy of the age distribution of faculty in these fields. With no further enrollment growth in sight for most NS&E fields, and with the likelihood of major declines in enrollment in some NS&E fields, it follows that the need for additional faculty will depend largely on retirements of existing faculty. This trend is of concern to some policy makers because it represents a potentially serious discontinuity in the production of Ph.D.'s and because aging faculty are held by some to be a liability in teaching and basic research. However, this downward trend in demand for doctorate teaching faculty could be offset to an important extent by increased demand for research faculty or by increased demand for Ph.D. NS&E's in industrial sectors.

The third trend is the growth in participation by foreign citizens in domestic Ph.D. programs in fields of NS&E, particularly in engineering. The increase over the last 10 years appears to be partly the result of relatively low starting salaries in many Ph.D. occupations (especially teaching), compared to starting salaries (and career options) for B.S. degrees. This trend is of concern to the extent that secondary effects may discourage domestic student participation in these fields.

MINORITY AND UNDER-REPRESENTED GROUPS

The 1987 request includes an initiative to broaden the participation of under-represented groups and individuals in the research and education enterprise.

Question: What specific actions is the Foundation planning and which groups are likely to be reached?

Answer:

- We are proposing a new initiative, Minority Research Centers of Excellence (MRCE), at $4,000,000. MRCE is designed to help predominantly minority institutions to plan and implement programs to upgrade their scientific and engineering research and training capabilities, and to provide assistance to neighboring minority institutions for this purpose. The goal is to increase the number and quality of minority scientists and engineers engaged in research careers.
- We propose an increase of $200,000 (from $2,500,000 to $2,700,000) for Minority Research Initiation (MRI). MRI seeks to bring minority scientists and engineers who have not previously received Federal research support into the mainstream of NSF research funding.
- We propose an increase of $250,000 (from $2,200,000 to $2,450,000) for the Research Opportunities for Women (ROW). ROW is directed to the needs of women scientists and engineers who have not received previous Federal research support and seeks to help them enter the main

stream of NSF research funding.

- We propose an increase of $2,800,000 from ($44,200,000 to $47,000,000) in support for researchers at predominantly undergraduate institutions (PUI). PUI seeks to encourage high-quality research as well as improved undergraduate training at these institutions, which often find it difficult to compete for funds with the major research centers.

- We propose an increase of $2,000,000 (from $2,000,000 to $4,000,000) for the Experimental Program to Stimulate Competitive Research (EPSCoR). These funds, along with a portion of FY 86 funds, will enable EPSCoR to make implementation awards to up to eight of the twelve states that received planning awards in FY 86. The effect of these awards, along with matching funds from state and other non-Federal sources, will be to help upgrade scientific and engineering research capabilities in areas of the country that are relatively less successful in competing for Federal and other research support.

FEDERAL RESOURCE LEVERAGING

NSF has talked about leveraging its resources.

Question: In what specific ways has this been done?

Answer: NSF continues in FY 1987, as in previous years, to leverage Federal dollars by encouraging and, where appropriate, requiring the participation of private sector organizations, academic institutions, and state and local governments as partners in funding research and education.

Examples of the success we have achieved in attracting outside funding to complement and extend the support provided by NSF include:

- The six Engineering Research Centers established last year have generated approximately $13 million in non-Federal support;

- The National Advanced Scientific Computing Centers which were also initiated last year have raised a 40 cent match for every dollar the Federal government provides;

- The $5.5 million provided for the FY 1985 College Science Instrumentation program awards will be matched by at least an equal amount; and

- The FY 1984 class of Presidential Young Investigators has succeeded in obtaining nearly $11 million in matching funds.

- So far during FY 1986, $1.9 million NSF investment in precollege instructional development has been matched by nearly $9 million from other sources.
- In the Industry/University Cooperative Research Centers, NSF and industry jointly provide funding. NSF support ceases after five years, at which time the centers must generate their support entirely from non-NSF sources.
- For several years, NSF has entered into agreements with equipment providers (particularly computer manufacturers) for significant discounts to NSF grantees.

In addition to the examples above, NSF funds are supplemented and complemented in many projects even where it is not a requirement. This frequently happens for example, in the provision of space, released time, and equipment.

INSTRUMENTATION

NSF has been emphasizing the support of instrumentation in recent years.

Question: What progress has been made with respect to addressing the research instrumentation needs of our colleges and universities?

Answer: NSF has indeed emphasized instrumentation support; over the past decade this portion of the NSF budget has tripled. At present about 50% of funds are furnished via the regular grant programs, 25% through special instrumentation programs dedicated to specific disciplinary needs, and the remaining 25% in major capital equipment, typically at national facilities.

One constructive change in the instrumentation picture has been a wider and better understanding of the problem. During the last few years approximately twenty studies have been completed. The problem is now perceived not only as a matter of shortages and accounting for equipment depreciation, but also as involving serious questions of technical obsolescence, researcher access, maintenance, and instructional needs.

Since the determination of instrumentation needs is to some extent subjective, and the needs themselves continue to evolve rapidly, measurement of progress in closing the instrumentation gap is exceptionally difficult. While some problems have been redressed, most reports hold that there is still a major shortfall in college and university instrumentation, typically estimated as being in the range of $1 to $4 billion.

There continues to be a requirement that NSF monitor and assess national needs for instrumentation in academia. This function is a component of the periodic science survey activities of the NSF Division of Science Resources Studies.

FOREIGN NATIONALS

Question: To what extent are foreign nationals pursuing graduate degrees in our Nation's colleges and universities?

Answer:

Science Engineering (S/E) Graduate Students

According to National Science Foundation (NSF) surveys of graduate science and engineering, the number of foreign nationals pursuing graduate studies in S/E fields in U.S. universities has increased steadily for nearly a decade and reached 64,000 full-time and about 12,000 part-time students by 1984. Most (95 percent) of these students were in doctorate-granting institutions, where the foreign students constituted a growing proportion of all S/E students, from 17 percent of the full-time students in 1977 to 25 percent in 1984.

S/E Masters' Degrees

The increased enrollment of foreign nationals is reflected in degree awards. At the master's level, about 11,300 degrees were awarded to foreign nationals in 1983. The proportion of all S/E master's degrees to foreigners rose from 12 percent in 1976 to 18 percent in 1983. Foreigners earned a larger proportion of awards in engineering than in any other field, where they earned 28 percent of the total. They also earned high proportions in mathematics (23 percent of all degrees) and computer/information sciences (22 percent). Data on master's degrees are collected biennially by the Center for Statistics of the Department of Education, and report only on foreigners holding temporary visas.

S/E Doctor's Degrees

The number of S/E doctorates awarded to foreign citizens is at an all-time high, over 4,800 in 1985, almost 28 percent of all S/E doctorates. Over 80 percent of these doctorates were awarded to foreign citizens on temporary visas. The annual surveys of doctorates by the National Science Foundation provide data for foreign nationals on both permanent and temporary visas. The 20 percent increase in foreign nationals receiving S/E doctorates that has occurred since 1974 has been due entirely to those on temporary visas.

Among S/E fields, foreign citizens constitute the largest share in engineering where they have received over half the doctorates each year since 1981. In 1985, they received 57 percent. In some science fields, especially mathematics and computer sciences, between 35 and 40 percent of the doctorates have been to foreign citizens since 1983. Foreign participation is lowest in the biological sciences (less than 15 percent) and psychology (5 percent).

Questions: Is this a cause for concern?

Answer: The topic of foreign nationals attending U.S. academic institutions was addressed in a statement by the National Science Board's Committee on International Science. The statement on January 17, 1985, observed,

> ". . . no disadvantages to this country derive from the fact that foreign nationals now comprise at least 25 percent and in some cases 50 percent of the graduate students and teaching faculties of U.S. engineering schools. On the contrary, the Committee points to the obvious fact that without the services of these foreign nationals, the U.S. would be unable to educate its own engineers.
>
> "In short, the Committee is not concerned about the major role that foreign nationals play in U.S. engineering schools except as an indication of fact that too few talented U.S. students are presently competing for places in those graduate schools or considering careers in academic engineering. The future strength of American industry requires that graduate study and university careers become more attractive options for U.S. students."

-- Statement of the views of the National Science Board Committee on International Science to the Planning and Policy Committee. January 17, 1985.

BASIC RESEARCH

In a year of dramatic non-defense budget reductions, the Foundation is seeking an increase of more than 8% over the 1986 level. The case you make hinges on an acceptance of the fact that basic research is tied to the nation's need to increase its productivity and prepare for its future in a highly competitive world.

Question: Would you elaborate on the linkage between basic scientific and engineering research and education and the Nation's long term future?

Answer: Although it is generally difficult to establish direct correlations between basic research and marketplace developments, there is clearly a very strong linkage between basic scientific and engineering research and education and the Nation's long-term future. New products and new processes do not appear full-grown but are usually the result of research and development activities painstakingly conducted over a number of years. Throughout its history, the Foundation has supported fundamental research which has served, and will continue to serve, as an underpinning for advances in science and technology. These advances are critical factors in improving the Nation's productivity, strengthening the economy, and maintaining a highly competitive posture with foreign markets.

The FY 1987 NSF budget request includes enhanced support for research in selected fields with high potential for long-term economic benefit, such as engineering materials, chemistry, computational science and engineering, biotechnology, and global geosciences. For example, the Foundation's increased support for Engineering Research Centers (ERC's) is aimed at providing heightened research opportunities and a stronger cross-disciplinary research environment in areas crucial to U.S. economic competitiveness. The

ERC's are designed to strengthen both research and education in engineering areas identified by universities and industries as being key to undergirding advances in U.S. technological capabilities over the long term. Areas of interest in the six ERC's established in FY 1985 are: robotic systems in microelectronics; telecommunications; composites manufacturing; systems research; biotechnology process engineering; and intelligent manufacturing systems.

The Foundation's effort in computational science and engineering responds to a major opportunity in many areas to significantly improve advanced research that increasingly relies on computational methods in addition to the more traditional experimental and theoretical approaches. This integrated approach to research allows the simulation of large-scale experiments that are impossible or extremely costly to carry out in a laboratory, as well as the entire design and testing of a complex new process or product entirely on a computer.

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS

The Congress provided that up to $500,000 of your FY 86 funding could be used for programmic support for the International Institute for Applied Systems Analysis (IIASA).

Question: What actions has NSF taken with respect to this recommendation?

Answer: The NSF has received a proposal from the American Academy of Arts and Sciences for $500,000 for a period of twelve months in support of research projects at IIASA in the following areas: ecologically sustainable development of the biosphere, environmental monitoring, population aging, system dynamics, and algorithm development for stochastic optimization problems. Our internal processing of the proposal has been completed.

The Administration's policy, as stated in the Secretary of State's letter of September 22, 1984 to Mr. McGeorge Bundy, requires that any proposed U.S. Government funding of IIASA project activities be subject to case-by-case review by the Department of State to ensure consistency with U.S. policies relating to international science and technology, including foreign policy and national security considerations. Accordingly, the NSF has formally requested the concurrence of the Department of State; we expect the Department's response imminently.

Question: What consideration has been given to finding additional or alternative sources of Federal support for this institution?

Answer: The NSF has not sought additional or alternative sources of Federal support for IIASA. We believe, however, that IIASA has sought support for other research projects from other government agencies, although we are not familiar with the specific nature of these requests.

VERY LONG BASELINE ARRAY

The budget request proposes to continue the stretch out schedule for the VLBA with $9.4 million.

Question: How is procurement of this major project proceeding?

Answer: Procurement of the Very Long Baseline Array (VLBA) is proceeding as follows:

- Construction of the ten antennae VLBA was proposed and is being carried out by the National Radio Astronomy Observatory (NRAO) which is managed by the Associated Universities, Inc. (AUI) under contract with the NSF.
- The $9.0 million appropriated in FY 1985 allowed the project to begin including procurement of a prototype antenna to be erected near Pie Town, New Mexico.
- $9.0 million was appropriated in FY 1986 to continue the construction. However, $8.6 million is the currently planned level after the Gramm Rudman Hollings reduction of March 1, 1986.
- Manufacture and delivery of 3 antennas has been authorized in FY 1986. These antennas are expected to be installed at Kitt Peak, AZ, Los Alamos, NM, and near Brewster, WA. Those long-lead items that are absolutely necessary for superior technical performance have also been authorized.
- Because of funding reductions and project stretch-out, AUI has been unable to honor the fixed-price antenna subcontract. Depending on the outcome of the required renegotiation of the contract and the cost of penalties, 1 or 2 antennas are expected to be procured in FY 1987 within the $9.4 million requested.
- A basic set of receivers (3 frequencies) will be installed for thorough testing as antennas are erected. Time standards and prototype data recording equipment will be available for individual antennas upon completion of testing.

ETHICS AND VALUES IN SCIENCE AND TECHNOLOGY

One small program previously proposed for termination is the Ethics and Values in Science and Technology (EVIST) Program. This proposal has generated a good deal of concern since EVIST is virtually the only ongoing Federal effort to address a growing multiplicity of ethical issues associated with advances in science and technology.

Question: What is the current status of this activity?

Answer: NSF is continuing its support of research on ethical and value issues in science, engineering and technology. For FY 1986, we expect to support projects totalling at least $500,000. We believe that such research is most valuable when carried out within the context of specific scientific or engineering disciplines. Thus responsibility for support of these projects has been distributed to the research directorates. Each directorate has been asked to identify areas in which research on ethics and values issues should be pursued, and each has been given a spending target (BBS=$200,000; AAEO, MPS and ENG each=$100,000). Coordination and oversight of this activity is the responsibility of the Directorate for Biological, Behavioral and Social Sciences, which has designated a full-time Coordinator for Ethics and Values Studies. BBS will provide technical assistance to other directorates in developing activities appropriate to their research communities; serve as a clearinghouse; and provide the overall monitoring and tracking services required by this kind of distributed activity.

Question: At what level, and in what manner, will this activity be supported during FY 87?

Answer: NSF is planning to continue this activity. The current plan is to continue the management procedures established in FY 1986 into FY 1987 and beyond. Subject to reevaluation in the event of severe budgetary stringency, we are planning to normalize this activity at about the level of $1.0 million.

ANTARCTIC PROGRAM

In the U. S.Antarctic Program, the cost of icebreaker support has been transferred to the Coast Guard's Budget.

Question: What are the major activities planned for the Antarctic Program in FY 87?

Answer: Major activities planned are similar to those carried out in the FY 1986 antarctic season. These are:

- Use of an icebreaker in study of the antarctic marine ecosystem and its relationship to the nutrient rich ice-edge zone;
- Use of icebreakers in the resupply of Palmer Station off the Antarctic Peninsula;
- Use of a polar class icebreaker to break the channel into McMurdo Station and to escort a tanker and a supply ship through the ice to the pier at McMurdo, and
- Use of icebreakers for various small science projects and for return of equipment and materials to the United States.

OCEAN DRILLING

Question: What is the status of the Ocean Drilling Program — specifically International commitment and participation?

Answer: The Ocean Drilling Program using JOIDES RESOLUTION has completed eight drilling legs ranging from Baffin Bay off Canada to the Mediterranean Sea. The scientific results are excellent and the new engineering developments for improved drilling have been successful.

International members at present are France, Federal Republic of Germany, United Kingdom, Canada, and Japan.

The European Science Foundation representing a consortium of ten smaller European countries has informed the NSF they expect to join as full members, starting June 1, 1986. Their contribution as the sixth international member will provide support for publication requirements plus inflationary increases in overall program costs in FY 1987. The USSR has not responded to recent inquiries on the status of their potential membership; however, NSF still views the USSR as a possible seventh international member.

In the FY 1986 NSF appropriations bill, the Congress provided permanent indemnification authority for this program, which was subject to some criticism.

Question: Is continuation of such authority necessary?

Answer: The government should be authorized to indemnify those activities that are extraordinarily hazardous and where appropriate amounts of private insurance are unavailable. The ODP contractor has been able to secure $200 million of coverage for riserless drilling and $500 million for riser drilling from a private insurer. This level of coverage is a factor of 4 to 10 greater than industry standards. We believe that these amounts are appropriate in light of the scientific and technical controls in the selection of sites that minimize the risk of a drilling mishap.

COLLEGE SCIENCE INSTRUMENTATION PROGRAM

Last year, Congress provided about $5 million for instrumentation at four-year institutions. NSF is requesting a $2.3 million increase for this activity in FY 87. This program is virtually the only educational support provided for undergraduate education.

Question: Please outline your reasoning in recommending this increase.

Answer: The $2.0 million increase requested for FY 87 would permit the Foundation to extend the benefits of this program to engineering departments and institutions which currently are not eligible to participate in the program. For engineering only, eligibility criteria would be modified to include all four-year colleges and universities. The program will thus greatly extend its impact in the engineering fields, where institutional needs are extreme.

OMB REQUEST

Please submit, for the record, a table containing your initial request to OMB for FY 87 and the levels contained in your FY 87 budget request. Please use the same level of detail as appears in the table "Level of Funding By Program" in your budget justification.

SUPERCOMPUTERS

The issue of foreign nationals from certain countries and their access to our university-based supercomputer center is one that has been receiving considerable attention for quite sometime.

Question: What is the status of the Administration's position with respect to this issue?

Answer: The issue of the access to supercomputers by nationals from Soviet bloc countries is currently being discussed by representatives of NSF and the Departments of State, Defense and Commerce. Although the issues are identified and there are emerging areas of agreement, no policy has yet been formulated.

Question: Does NSF believe that with the establishment of the centers in 1986, all the academic centers that are needed have been created?

Answer: We estimate that the demand for supercomputer access will exceed the capacity of our centers sometime in early FY 1987. Even with anticipated and planned upgrades at existing centers, we foresee the need for at least another six centers (or the equivalent capacity at the existing centers) over the next five years, or approximately one new facility per year. The projections are determined by the present rapid surge in use rate of about a 10-fold increase per year.

MATH/SCIENCE AUTHORIZATION

Congress passed the FY 85 NSF appropriations before enacting the Education for Economic Security Act. As a consequence, the provisions of that Act relating to NSF have not been funded, although ongoing NSF education programs parallel much of the activity envisioned in the authorization legislation. Last year, this authorization was extended, but after much of the preparation of your budget had already been completed.

Question: Please outline what steps you have taken in addressing the program goals outlined in that legislation.

Answer: The Directorate for Science and Engineering Education has, in place, specific programmatic activities to meet the functional objectives of the NSF Statutory Authority Act (February

NATIONAL SCIENCE FOUNDATION
COMPARISON OF FY 1987 OMB REQUEST
TO THE CONGRESSIONAL REQUEST
(Dollars in Thousands)

	FY 1987 Request to OMB	FY 1987 Request to Congress	Difference Cong/OMB
MATHEMATICAL AND PHYSICAL SCIENCES	$490,410	$449,250	($41,160)
ENGINEERING	254,230	185,470	(68,760)
BIOLOGICAL, BEHAVIORAL, AND SOCIAL SCIENCES	309,190	282,410	(26,780)
ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES	402,020	383,210	(18,810)
SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS	59,920	47,030	(12,890)
ADVANCED SCIENTIFIC COMPUTING	58,100	53,630	(4,470)
PROGRAM DEVELOPMENT AND MANAGEMENT	78,000	78,000	0
TOTAL, RESEARCH AND RELATED	$1,651,870	$1,479,000	($172,870)
U.S. ANTARCTIC PROGRAM	126,840	117,000	(9,840)
SCIENCE AND ENGINEERING EDUCATION ACTIVITIES	112,000	89,000	(23,000)
SPECIAL FOREIGN CURRENCY PROGRAM	1,000	700	(300)
TOTAL, NATIONAL SCIENCE FOUNDATION	$1,891,710	$1,685,700	($206,010)

THRUSTS			
Biotechnology	35,000	20,000	(15,000)
Computational Science and Engineering	60,000	27,000	(33,000)
Broadening Participation in Science and Engineering Research and Educaton	60,000	19,000	(41,000)
Engineering Research Centers/ Graduate Education	50,000	0	(50,000)
Global Geosciences	0	18,000	18,000
Total, Thrusts	205,000	84,000	(121,000)

NATIONAL SCIENCE FOUNDATION
COMPARISON OF FY 1987 OMB REQUEST
TO THE CONGRESSIONAL REQUEST
(Dollars in Thousands)
(Continued)

	FY 1987 Request to OMB	FY 1987 Request to Congress	Difference Cong/OMB
U.S. ANTARCTIC PROGRAM			
U.S. Antarctic Research Program	$12,000	$12,000	$0
Operations Support	114,840	105,000	(9,840)
TOTAL, U.S. ANTARCTIC PROGRAM	$126,840	$117,000	($9,840)
SCIENCE AND ENGINEERING EDUCATION ACTIVITIES			
Research Career Development	27,300	27,300	0
Materials Development, Research, and Informal Science Education	28,000	25,000	(3,000)
Teacher Preparation and Enhancement	28,300	27,000	(1,300)
Studies and Program Assessment	2,400	2,200	(200)
College Science Instrumentation	6,000	7,500	1,500
TOTAL, SCIENCE AND ENGINEERING EDUCATION ACTIVITIES	$92,000	$89,000	($3,000)
SPECIAL FOREIGN CURRENCY PROGRAM	1,000	700	(300)
TOTAL, NATIONAL SCIENCE FOUNDATION	$1,686,710	$1,685,700	($1,010)

NATIONAL SCIENCE FOUNDATION
COMPARISON OF FY 1987 OMB REQUEST TO THE CONGRESSIONAL REQUEST
(Dollars in Thousands)

	FY 1987 Request to OMB	FY 1987 Request to Congress	Difference Cong/OMB
MATHEMATICAL AND PHYSICAL SCIENCES			
Mathematical Sciences	$61,690	$59,800	($1,890)
Computer Research	47,930	44,440	(3,490)
Physics	126,210	126,640	430
Chemistry	96,070	101,020	4,950
Materials Research	118,510	117,350	(1,160)
Subtotal, MPS	450,410	449,250	(1,160)
ENGINEERING			
Chemical, Biochemical, and Thermal Engineering	28,940	30,210	1,270
Mechanics, Structures, and Materials Engineering	24,270	26,270	2,000
Electrical, Communications, and Systems Engineering	27,090	26,270	(820)
Design, Manufacturing, and Computer Engineering	22,270	21,670	(600)
Emerging and Critical Engineering Systems	38,970	43,050	4,080
Cross-Disciplinary Research	40,890	38,000	(2,890)
Subtotal, ENG	182,430	185,470	3,040
BIOLOGICAL, BEHAVIORAL, AND SOCIAL SCIENCES			
Molecular Biosciences	63,740	67,100	3,360
Cellular Biosciences	54,230	56,590	2,360
Biotic Systems and Resources	64,690	66,510	1,620
Behavioral and Neural Sciences	47,380	48,870	1,490
Social and Economic Science	33,890	31,430	(2,460)
Information Science and and Technology	11,560	11,910	350
Subtotal, BBS	275,690	282,410	6,720

NATIONAL SCIENCE FOUNDATION
COMPARISON OF FY 1987 OMB REQUEST
TO THE CONGRESSIONAL REQUEST
(Dollars in Thousands)
(Continued)

	FY 1987 Request to OMB	FY 1987 Request to Congress	Difference Cong/OMB
ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES			
Astronomical Sciencess	$88,050	$85,060	($2,990)
Atmospheric Sciences	98,620	100,650	2,030
Earth Sciences	56,490	54,950	(1,540)
Ocean Sciences	131,390	133,660	2,270
Arctic Research Program	8,770	8,890	120
Subtotal, AAEO	383,320	383,210	(110)
SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS			
Industrial Science and Technological Innovation	17,290	17,150	(140)
International Cooperative Scientific Activities	12,660	12,660	0
Policy Research and Analysis	1,990	1,990	0
Science Resources Studies	3,990	4,240	250
Research Initiation and Improvement	6,990	10,990	4,000
Subtotal, STIA	42,920	47,030	4,110
ADVANCED SCIENTIFIC COMPUTING	54,100	53,630	(470)
PROGRAM DEVELOPMENT AND MANAGEMENT	78,000	78,000	0
TOTAL, RESEARCH AND RELATED ACTIVITIES	$1,466,870	$1,479,000	$12,130

1986) as specified in Section III, Title I, section 102. The objectives and corresponding programs are listed below:

Functional Objectives	NSF Program
(1) Enhancement of public understanding of science and engineering through informal education activities using a variety of mediums such as broadcasting, museums, clubs, and amateur science societies.	Informal Science Education Program
(3) Enhancement of the quality of science and engineering instruction in colleges of teacher education.	The projects funded under the pre-college division of the Directorate include a variety of cooperative activities between college science and math departments and education departments.
(6) Development of precollege mathematics, science and engineering education and training.	This is the major goal of the programs under the Division of Teacher Preparation and Enhancement.
(7) Encouragement of potential students, including underrepresented and underserved populations, to pursue careers in mathematics, science, and engineering.	There are projects under each program in the Directorate that have as a major focus to increase the motivation and interest of persons in these special groups in science careers. All program guidelines strongly encourage the submission of proposals aimed at this objective.
(8) Development of instructional instrumentation and systems for postsecondary technical, engineering, and scientific education.	College Science Instrumentation Program
(9) Development of science, engineering, and education networks to aid in the development and dissemination of successful curricula, methods, and materials.	Science and Mathematics Education Networks Program

INSTITUTIONS RANKED BY FY 1983 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 13
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
1	1317	UNIV OF CAL SAN DIEGO	36,402	104,871	34.7
2	8779	CORNELL UNIVERSITY	32,250	93,644	34.4
3	2178	MASS INST OF TECHNOLOGY	31,506	178,706	17.6
4	1775	UNIV OF ILL URBANA	21,132	66,055	32.0
5	2707	COLUMBIA UNIV MAIN DIV	20,485	101,006	20.3
6	1305	STANFORD UNIVERSITY	19,459	140,098	13.9
7	2230	WOODS HOLE OCNGRPHIC INST	17,966	31,039	57.9
8	1312	UNIV OF CAL BERKELEY	17,637	75,293	23.4
9	3798	UNIVERSITY OF WASHINGTON	16,749	114,294	14.7
10	3895	UNIV OF WIS-MADISON	15,254	93,568	16.3
11	1131	CALIFORNIA INST OF TECH	14,987	44,076	34.0
12	9091	UNIVERSITY OF MICHIGAN	14,764	81,248	18.2
13	1315	UNIV OF CAL LOS ANGELES	13,994	108,450	12.9
14	2290	MICHIGAN STATE UNIVERSITY	13,985	41,935	33.3
15	2155	HARVARD UNIVERSITY	12,490	89,457	14.0
16	1774	UNIVERSITY OF CHICAGO	12,276	62,318	19.7
17	3378	UNIV OF PENNSYLVANIA	11,045	83,251	13.3
18	2627	PRINCETON UNIVERSITY	10,490	26,782	39.2
19	8731	INDIANA UNIVERSITY	9,985	30,559	32.4
20	8761	UNIVERSITY OF MINNESOTA	9,369	74,102	12.6
21	1739	NORTHWESTERN UNIVERSITY	9,359	37,284	25.1
22	8732	PURDUE UNIVERSITY	9,220	37,346	24.7
23	3210	OREGON STATE UNIVERSITY	8,918	31,030	28.7
24	1426	YALE UNIVERSITY	8,916	88,335	10.1
25	3658	UNIV OF TEXAS AT AUSTIN	8,631	56,300	15.3
26	2103	UNIV OF MD COLLEGE PARK	8,559	35,514	24.1
27	1083	UNIVERSITY OF ARIZONA	8,376	40,110	20.9
28	8717	UNIVERSITY OF COLORADO	7,980	50,626	15.8
29	9555	SUNY AT STONY BROOK	7,782	24,941	31.2
30	8802	OHIO STATE UNIVERSITY	7,385	45,543	16.2
31	1328	UNIV OF SOUTHERN CAL	7,371	62,837	11.7
32	2077	JOHNS HOPKINS UNIVERSITY	7,312	318,374	2.3
33	3401	BROWN UNIVERSITY	7,242	19,798	36.6
34	1320	UNIV OF CAL SANTA BARBARA	7,081	16,895	41.9
35	8813	PENNSYLVANIA STATE UNIV	6,966	61,798	11.3
36	3242	CARNEGIE-MELLON UNIV	6,872	36,345	18.9
37	8771	RUTGERS THE ST UNIV OF NJ	6,853	19,647	34.9
38	2221	UNIV OF MASS AT AMHERST	6,308	18,236	34.6
39	1536	UNIVERSITY OF MIAMI	6,159	28,936	21.3
40	3675	UNIVERSITY OF UTAH	6,148	40,853	15.0
41	1350	COLORADO STATE UNIVERSITY	6,123	25,022	24.5
42	3632	TEXAS A & M UNIVERSITY	6,085	35,407	17.2
43	2920	DUKE UNIVERSITY	5,772	55,619	10.4
44	2894	UNIVERSITY OF ROCHESTER	5,604	53,358	10.5
45	1535	UNIVERSITY OF FLORIDA	5,205	35,549	14.6
46	8815	UNIVERSITY OF PITTSBURGH	5,128	45,805	11.2
47	3414	UNIV OF RHODE ISLAND	4,878	13,962	34.9
48	3024	CASE WESTERN RESERVE UNIV	4,875	38,438	12.7
49	1610	UNIV OF HAWAII-MANOA	4,857	24,226	20.0
50	1598	UNIVERSITY OF GEORGIA	4,777	22,538	21.2
51	1081	ARIZONA STATE UNIVERSITY	4,618	8,206	56.3
52	1313	UNIV OF CAL DAVIS	4,535	35,729	12.7
53	3745	UNIVERSITY OF VIRGINIA	4,348	27,984	15.5

INSTITUTIONS RANKED BY FY 1983 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 14
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
54	1489	FLORIDA STATE UNIVERSITY	4,274	14,107	30.3
55	1314	UNIV OF CAL IRVINE	4,201	23,874	17.6
56	2974	UNIV OF NC AT CHAPEL HILL	4,122	47,228	8.7
57	2785	NEW YORK UNIVERSITY	3,864	51,975	7.4
58	29094	UNIV OF ALASKA FAIRBANKS	3,753	6,822	55.0
59	3604	RICE UNIVERSITY	3,658	10,507	34.8
60	8819	UNIV OF SOUTH CAROLINA	3,492	7,516	46.5
61	2529	WASHINGTON UNIVERSITY	3,245	55,754	5.8
62	2972	N C STATE UNIV AT RALEIGH	3,232	20,604	15.7
63	3223	UNIVERSITY OF OREGON MAIN	3,185	11,220	28.4
64	2803	RENSSELAER POLYTECH INST	3,100	12,358	25.1
65	9554	SUNY AT BUFFALO	3,003	17,175	17.5
66	3754	VA POLYTECH INST & ST U	2,910	20,602	14.1
67	8723	GEORGIA INSTITUTE OF TECH	2,855	45,835	6.2
68	2133	BRANDEIS UNIVERSITY	2,803	11,110	25.2
69	1431	UNIVERSITY OF DELAWARE	2,775	8,739	31.8
70	3800	WASHINGTON STATE UNIV	2,706	15,559	17.4
71	8718	UNIVERSITY OF CONNECTICUT	2,655	26,397	10.1
72	2835	SUNY AT ALBANY	2,602	14,324	18.2
73	1892	UNIVERSITY OF IOWA	2,548	41,121	6.2
74	8789	SYRACUSE UNIVERSITY	2,541	9,840	26.1
75	1321	UNIV OF CAL SANTA CRUZ	2,514	4,884	51.5
76	1316	UNIV OF CAL RIVERSIDE	2,452	10,940	22.4
77	1840	UNIVERSITY OF NOTRE DAME	2,452	8,016	30.6
78	3652	U OF HOUSTON UNIV PARK	2,257	6,667	33.9
79	1869	IOWA ST U OF SCI & TECH	2,243	11,908	18.8
80	2565	UNIV OF NEBRASKA-LINCOLN	2,179	8,894	24.5
81	3289	LEHIGH UNIVERSITY	2,159	7,947	27.2
82	2130	BOSTON UNIVERSITY	2,038	38,406	5.3
83	2329	WAYNE STATE UNIVERSITY	2,022	15,304	13.2
84	3932	UNIVERSITY OF WYOMING	1,959	11,418	17.2
85	8745	LOUISIANA STATE UNIV	1,907	21,186	9.0
86	1776	UNIV OF ILL CHICAGO	1,903	22,460	8.5
87	3530	U TENNESSEE KNOXVILLE	1,880	14,415	13.0
88	3535	VANDERBILT UNIVERSITY	1,876	31,996	5.9
89	2573	DARTMOUTH COLLEGE	1,749	10,568	16.5
90	2807	ROCKEFELLER UNIVERSITY	1,669	25,245	6.6
91	2688	CUNY CITY COLLEGE	1,661	4,973	33.4
92	8805	UNIVERSITY OF CINCINNATI	1,633	20,403	8.0
93	3677	UTAH STATE UNIVERSITY	1,623	16,093	10.1
94	2663	UNIVERSITY OF NEW MEXICO	1,617	22,189	7.3
95	29001	UNIVERSITY OF KANSAS	1,599	15,368	10.4
96	8807	UNIVERSITY OF OKLAHOMA	1,580	9,344	16.9
97	2053	UNIV OF MAINE ORONO	1,544	5,960	25.9
98	2532	MONTANA STATE UNIVERSITY	1,544	4,936	31.3
99	8744	UNIVERSITY OF KENTUCKY	1,518	14,317	10.6
100	1928	KANS ST U - AG & APP SCI	1,419	8,407	16.9
101	1151	SAN DIEGO STATE UNIV	1,359	2,535	53.6
102	2199	NORTHEASTERN UNIVERSITY	1,350	5,697	23.7
103	1319	UNIV OF CAL SAN FRANCISCO	1,346	75,718	1.8
104	3896	UNIV OF WIS-MILWAUKEE	1,324	2,158	61.4
105	1108	UNIV OF ARK FAYETTEVILLE	1,275	2,837	44.9
106	2796	POLYTECHNIC INST OF N Y	1,246	3,847	32.4

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
107	2589	UNIV OF NEW HAMPSHIRE	1,216	8,662	14.0
108	2517	UNIV OF MISSOURI ROLLA	1,148	2,927	39.2
109	1564	EMORY UNIVERSITY	1,122	20,569	5.5
110	2516	UNIV OF MISSOURI COLUMBIA	1,099	16,939	6.5
111	2699	CLARKSON COLLEGE OF TECH	1,086	2,379	45.6
112	3256	DREXEL UNIVERSITY	1,084	4,482	24.2
113	1691	ILLINOIS INST OF TECH	1,060	5,677	18.7
114	3827	WEST VIRGINIA UNIVERSITY	1,054	7,883	13.4
115	1444	GEORGE WASHINGTON UNIV	1,052	17,791	5.9
116	9741	UNIV OF TEXAS AT DALLAS	966	3,656	26.4
117	8806	OKLAHOMA STATE UNIVERSITY	948	9,672	9.8
118	1155	SAN JOSE STATE UNIVERSITY	937	3,189	29.4
119	2219	TUFTS UNIVERSITY	933	24,604	3.8
120	2029	TULANE UNIVERSITY	914	11,636	7.9
121	3644	TEXAS TECH UNIVERSITY	900	9,409	9.6
122	2903	YESHIVA UNIVERSITY	885	51,279	1.7
123	8001	UNIV OF ILLINOIS SYS OFF	843	1,295	65.1
124	8773	NEW MEXICO STATE UNIV	842	27,452	3.1
125	3371	TEMPLE UNIVERSITY	791	16,100	4.9
126	1371	UNIVERSITY OF DENVER	783	6,040	13.0
127	3696	UNIV OF VT & ST AGRIC COL	773	13,309	5.8
128	2836	SUNY AT BINGHAMTON	742	2,452	30.3
129	8799	KENT STATE UNIVERSITY	735	1,780	41.3
130	1052	UNIV ALABAMA BIRMINGHAM	734	32,627	2.2
131	1737	NORTHERN ILLINOIS UNIV	692	1,241	55.8
132	1445	GEORGETOWN UNIVERSITY	683	20,865	3.3
133	2292	MICHIGAN TECH UNIVERSITY	653	2,661	24.5
134	3613	SOUTHERN METHODIST UNIV	628	2,078	30.2
135	8828	COLLEGE OF WILLIAM & MARY	624	1,251	49.9
136	3863	MARQUETTE UNIVERSITY	608	1,167	52.1
137	3425	CLEMSON UNIVERSITY	592	7,345	8.1
138	1448	HOWARD UNIVERSITY	580	8,777	6.6
139	5766	ST LOUIS UNIVERSITY	560	7,647	7.3
140	3735	VIRGINIA COMMONWLTH UNIV	551	19,856	2.8
141	8764	UNIVERSITY OF MISSISSIPPI	550	6,032	9.1
142	2654	N MEX INST MINING & TECH	547	3,959	13.8
143	8856	OREGON GRADUATE CENTER	543	2,752	19.7
144	1424	WESLEYAN UNIVERSITY	527	1,764	29.9
145	2104	UNIV OF MD BALT PROF SCH	526	18,679	2.8
146	2620	UNIV OF MED & DENT OF N J	503	11,870	4.2
147	12310	UNIVERSITY OF AKRON	476	1,466	32.5
148	8695	AUBURN UNIVERSITY	468	7,796	6.0
149	2686	CUNY CENTRAL SYS OFF	457	457	100.0
150	1434	AMERICAN UNIVERSITY	452	789	57.3
151	2128	BOSTON COLLEGE	449	5,718	7.9
152	1050	TUSKEGEE INSTITUTE	447	3,515	12.7
153	9756	U MASS MED SCHL WORCESTER	415	10,606	3.9
154	1537	UNIV OF SOUTH FLORIDA	410	3,932	10.4
155	11618	U TEX HLTH SCI CTR HOUSTN	409	13,703	3.0
156	2233	WORCESTER POLY INSTITUTE	407	947	43.0
157	2410	JACKSON STATE UNIVERSITY	398	1,075	37.0
158	2978	WAKE FOREST UNIVERSITY	394	10,017	3.9
159	3944	UNIV OF P R-MAYAGUEZ	392	640	61.2

INSTITUTIONS RANKED BY FY 1983 NSF R&D OBLIGATIONS (THOUSANDS OF DOLLARS) 12:38 FRIDAY, MARCH 14, 1986 16

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
160	3370	SWARTHMORE COLLEGE	388	458	84.7
161	1348	COLORADO SCHOOL OF MINES	387	1,471	26.3
162	2851	SUNY COL OF ENV SCI & FOR	374	557	67.1
163	7026	CUNY MT SINAI SCH OF MED	371	22,595	1.6
164	2139	CLARK UNIVERSITY	367	1,182	31.0
165	8907	DESERT RESEARCH INSTITUTE	365	740	49.3
166	1999	UNIVERSITY OF LOUISVILLE	350	3,156	11.1
167	2161	UNIVERSITY OF LOWELL	345	1,200	28.7
168	1626	UNIVERSITY OF IDAHO	343	4,987	6.9
169	3470	S DAK SCH MINES & TECH	342	748	45.7
170	2687	CUNY BROOKLYN COLLEGE	334	1,535	21.8
171	8803	OHIO UNIVERSITY	320	1,247	25.7
172	2536	UNIVERSITY OF MONTANA	311	1,635	19.0
173	3728	OLD DOMINION UNIVERSITY	310	3,154	9.8
174	2905	NC AG & TECH STATE UNIV	298	3,789	7.9
175	2804	HARTFORD GRADUATE CENTER	294	294	100.0
176	1082	NORTHERN ARIZONA UNIV	293	652	44.9
177	3185	UNIVERSITY OF TULSA	289	597	48.4
178	4949	BAYLOR COL OF MEDICINE	276	35,551	0.8
179	2568	UNIV OF NEVADA - RENO	270	6,312	4.3
180	1139	CALIF ST UNIV LONG BEACH	269	473	56.9
181	8800	MIAMI UNIVERSITY (OHIO)	267	518	51.5
182	3659	U TEX HLTH SCI CTR S ANTO	260	14,392	1.8
183	2025	SOUTHERN U & A&M COLLEGE	249	1,659	15.0
184	2106	U OF MD EASTERN SHORE	249	1,325	18.8
185	1807	INDIANA STATE UNIVERSITY	247	492	50.2
186	3714	HAMPTON INSTITUTE	244	998	24.4
187	1950	WICHITA STATE UNIVERSITY	243	706	34.4
188	3278	THOMAS JEFFERSON UNIV	235	6,353	3.7
189	1758	SOUTHERN ILL U-CARBONDALE	234	3,821	6.1
190	3594	NORTH TEXAS STATE UNIV	233	1,586	14.7
191	3954	UNIV OF CENTRAL FLORIDA	229	1,938	11.8
192	4063	CUNY GRAD SCH & UNIV CTR	229	703	32.6
193	2307	OAKLAND UNIVERSITY	225	2,180	10.3
194	1101	UNIV OF ARK LITTLE ROCK	224	436	51.4
195	3656	UNIV OF TEX AT ARLINGTON	223	342	65.2
196	1509	NOVA UNIVERSITY	219	352	62.2
197	2840	SUNY UPSTATE MEDICAL CTR	218	5,109	4.3
198	3438	MED UNIV OF SO CAROLINA	214	7,759	2.8
199	12305	BRIGHAM YOUNG UNIVERSITY	211	2,096	10.1
200	1055	UNIV ALABAMA HUNTSVILLE	203	2,467	8.2
201	7737	MED COL OF OHIO AT TOLEDO	201	4,140	4.9
202	3506	MEHARRY MEDICAL COLLEGE	200	1,791	11.2
203	1574	GEORGIA STATE UNIVERSITY	197	966	20.4
204	7885	UNIV OF HAWAII SYS OFF	197	334	59.0
205	2839	SUNY DOWNSTATE MED CTR	196	8,177	2.4
206	1437	CATHOLIC UNIV OF AMERICA	195	2,379	8.2
207	3398	THE MEDICAL COL OF PENNA	192	3,193	6.0
208	1582	MOREHOUSE COLLEGE	190	546	34.8
209	1051	THE UNIVERSITY OF ALABAMA	187	1,050	17.8
210	1137	CALIF ST UNIV FULLERTON	186	370	50.3
211	7108	UNIV OF P R-RIO PIEDRAS	183	4,748	3.9
212	1551	ATLANTA UNIVERSITY	179	1,747	10.2

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
213	3238	BUCKNELL UNIVERSITY	174	244	71.3
214	1154	SAN FRANCISCO STATE UNIV	172	840	20.5
215	9167	WRIGHT STATE UNIVERSITY	171	2,677	6.4
216	2015	UNIVERSITY OF NEW ORLEANS	165	854	19.3
217	2621	N J INST OF TECHNOLOGY	165	550	30.0
218	2210	SOUTHEASTERN MASS UNIV	151	478	31.6
219	2542	CREIGHTON UNIVERSITY	149	926	16.1
220	3265	FRANKLIN & MARSHALL COL	147	218	67.4
221	2105	U OF MD BALTIMORE COUNTY	144	1,410	10.2
222	2639	STEVENS INSTITUTE OF TECH	143	2,114	6.8
223	2690	CUNY QUEENS COLLEGE	143	671	21.3
224	3237	BRYN MAWR COLLEGE	140	305	45.9
225	2224	WELLESLEY COLLEGE	139	465	29.9
226	2229	WILLIAMS COLLEGE	136	242	56.2
227	2115	AMHERST COLLEGE	134	559	24.0
228	3802	WESTERN WASHINGTON UNIV	134	370	36.2
229	3660	U TEX HLTH SCI CTR DALLAS	133	27,787	0.5
230	2758	MANHATTAN COLLEGE	132	610	21.6
231	3131	UNIVERSITY OF TOLEDO	126	980	12.9
232	3636	TEXAS CHRISTIAN UNIV	126	422	29.9
233	29109	FRANKLIN PIERCE LAW CTR	125	186	67.2
234	1140	CALIF ST UNIV LOS ANGELES	123	285	43.2
235	2708	BARNARD COLLEGE	123	216	56.9
236	8796	BOWLING GREEN STATE UNIV	123	662	18.6
237	2273	HOPE COLLEGE	120	417	28.8
238	4952	U TEX MED BRNCH GALVESTON	120	10,778	1.1
239	8296	MEDICAL COLLEGE OF WIS	120	10,360	1.2
240	2834	SUNY SYSTEM OFFICE	119	298	39.9
241	1153	CALIF ST UNIV NORTHRIDGE	116	679	17.1
242	1659	U HLTH SCI/CHCGO MED SCH	115	1,892	6.1
243	6725	UNIV TENN CTR HEALTH SCI	115	8,371	1.4
244	1481	FLORIDA ATLANTIC UNIV	113	289	39.1
245	3509	MEMPHIS STATE UNIVERSITY	112	612	18.3
246	3434	FURMAN UNIVERSITY	110	118	93.2
247	1692	ILLINOIS STATE UNIVERSITY	107	237	45.1
248	3680	WEBER STATE COLLEGE	106	122	86.9
249	3713	HAMPDEN-SYDNEY COLLEGE	106	106	100.0
250	8794	UNIVERSITY OF N DAKOTA	106	6,986	1.5
251	1057	UNIV OF SOUTH ALABAMA	105	3,980	2.6
252	2518	UNIV OF MISSOURI KAN CITY	105	181	58.0
253	2222	UNIV OF MASS BOSTON	104	1,071	9.7
254	9266	NORTH DAKOTA STATE UNIV	104	3,045	3.4
255	3523	TENN TECHNOLOGICAL UNIV	96	308	31.2
256	3487	EAST TENNESSEE STATE UNIV	95	183	51.9
257	1710	LOYOLA UNIV - CHICAGO	94	2,677	3.5
258	1143	CAL POLY ST U SAN LUIS OB	93	455	20.4
259	3086	OBERLIN COLLEGE	87	174	50.0
260	2923	EAST CAROLINA UNIVERSITY	84	994	8.5
261	3894	UNIV OF WISCONSIN SYS OFF	84	695	12.1
262	1915	FORT HAYS ST UNIV	81	95	85.3
263	3768	WASHINGTON & LEE UNIV	80	80	100.0
264	9635	FLORIDA INTERNATIONAL U	80	307	26.1
265	3032	CLEVELAND STATE UNIV	79	1,274	6.2

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
266	1173	POMONA COLLEGE	78	461	16.9
267	7963	COLUMBIA UNIV SYS OFF	78	313	24.9
268	2632	SETON HALL UNIVERSITY	77	77	100.0
269	3258	DUQUESNE UNIVERSITY	77	177	43.5
270	2330	WESTERN MICHIGAN UNIV	76	149	51.0
271	3945	UNIV OF P R-MED SCI CMPUS	76	2,683	2.8
272	1171	HARVEY MUDD COLLEGE	75	245	30.6
273	1347	COLORADO COLLEGE	74	74	100.0
274	1326	UNIVERSITY OF SANTA CLARA	72	749	9.6
275	2689	CUNY HUNTER COLLEGE	71	1,561	4.5
276	2889	UNION COLLEGE (NY)	70	70	100.0
277	2895	VASSAR COLLEGE	70	390	17.9
278	2906	APPALACHIAN ST UNIVERSITY	70	70	100.0
279	7022	CUNY LEHMAN COLLEGE	66	184	35.9
280	2038	BOWDOIN COLLEGE	65	65	100.0
281	2722	FORDHAM UNIVERSITY	65	399	16.3
282	2147	EMMANUEL COLLEGE	60	1,312	4.6
283	1146	CALIF STATE UNIV CHICO	59	79	74.7
284	8155	EVERGREEN STATE COLLEGE	58	58	100.0
285	4882	OREGON HLTH SCIENCES UNIV	57	10,270	0.6
286	2984	UNIV OF N C AT WILMINGTON	56	146	38.4
287	3216	PORTLAND STATE UNIVERSITY	56	906	6.2
288	3217	REED COLLEGE	55	239	23.0
289	2622	KEAN COL OF NEW JERSEY	53	53	100.0
290	3127	UNIVERSITY OF DAYTON	53	18,175	0.3
291	1414	TRINITY COLLEGE	50	50	100.0
292	2842	SUNY COLLEGE BUFFALO	50	286	17.5
293	2887	ALBANY MEDICAL COLLEGE	50	7,613	0.7
294	3657	U TEXAS SYSTEM CANCER CTR	50	14,693	0.3
295	3935	UNIVERSITY OF GUAM	50	1,080	4.6
296	2666	ADELPHI UNIVERSITY	47	116	40.5
297	2823	ST JOHN'S UNIVERSITY (NY)	47	47	100.0
298	2780	NEW SCH FOR SOC RESEARCH	46	66	69.7
299	1109	U OF ARKANSAS MED SCI CAM	45	2,107	2.1
300	1788	BUTLER UNIVERSITY	45	225	20.0
301	2569	UNIV OF NEVADA LAS VEGAS	45	823	5.5
302	2189	WESTFIELD STATE COLLEGE	44	44	100.0
303	2841	SUNY COLLEGE BROCKPORT	44	44	100.0
304	2441	UNIV OF STHRN MISSISSIPPI	43	521	8.3
305	2668	ALFRED UNIVERSITY	43	43	100.0
306	2975	UNIV OF N C AT CHARLOTTE	43	156	27.6
307	3923	UNIV OF WIS-RIVER FALLS	43	43	100.0
308	2192	MOUNT HOLYOKE COLLEGE	41	182	22.5
309	1671	DE PAUL UNIVERSITY	40	92	43.5
310	7109	SUNY COL AT OLD WESTBURY	40	40	100.0
311	2323	UNIVERSITY OF DETROIT	39	348	11.2
312	3274	HAVERFORD COLLEGE	39	39	100.0
313	2936	BATES COLLEGE	38	38	100.0
314	2849	SUNY COLLEGE PLATTSBURGH	38	163	23.3
315	1002	ALABAMA A & M UNIVERSITY	35	1,730	2.0
316	3775	EASTERN WASHINGTON UNIV	35	156	22.4
317	1037	SELMA UNIVERSITY	34	34	100.0
318	2519	UNIV OF MISSOURI ST LOUIS	34	284	12.0

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
319	3474	UNIV OF SOUTH DAKOTA	34	564	6.0
320	3050	JOHN CARROLL UNIVERSITY	33	152	21.7
321	1329	UNIVERSITY OF THE PACIFIC	32	618	5.2
322	2477	KIRKSVILLE COL OSTEO MED	32	317	10.1
323	2681	CANISIUS COLLEGE	32	32	100.0
324	9630	UNIV OF WIS-OSHKOSH	32	32	100.0
325	2843	SUNY COLLEGE CORTLAND	31	48	64.6
326	3084	MUSKINGUM COLLEGE	31	31	100.0
327	8772	EASTERN NEW MEXICO UNIV	31	31	100.0
328	1674	EASTERN ILLINOIS UNIV	30	30	100.0
329	1005	ALABAMA STATE UNIVERSITY	29	104	27.9
330	1469	FLORIDA INST OF TECH	29	829	3.5
331	3284	LAFAYETTE COLLEGE	29	29	100.0
332	1694	CHICAGO STATE UNIVERSITY	28	66	42.4
333	3778	GONZAGA UNIVERSITY	28	42	66.7
334	29040	CUNY COL STATEN ISLAND	28	101	27.7
335	1249	OCCIDENTAL COLLEGE	27	27	100.0
336	3785	PACIFIC LUTHERAN UNIV	27	47	57.4
337	2241	CALVIN COLLEGE	26	26	100.0
338	2008	LOUISIANA TECH UNIVERSITY	25	303	8.3
339	2340	CARLETON COLLEGE	25	25	100.0
340	2379	ST JOHN'S UNIVERSITY	25	25	100.0
341	2515	UNIV OF MISSOURI SYS OFF	25	831	3.0
342	2616	MONMOUTH COLLEGE (NJ)	25	25	100.0
343	2728	HAMILTON COLLEGE	25	25	100.0
344	3262	ELIZABETHTOWN COLLEGE	24	24	100.0
345	3884	RIPON COLLEGE	24	24	100.0
346	29020	UNIV HAWAII AT HILO	24	1,300	1.8
347	2703	COL OF MOUNT ST VINCENT	23	23	100.0
348	3065	KENYON COLLEGE	23	63	36.5
349	3230	ALLEGHENY COLLEGE	23	23	100.0
350	10115	U OF TEXAS AT SAN ANTONIO	23	958	2.4
351	1868	GRINNELL COLLEGE	22	22	100.0
352	3197	LEWIS & CLARK COLLEGE	22	22	100.0
353	3744	UNIVERSITY OF RICHMOND	21	42	50.0
354	1616	BOISE STATE UNIVERSITY	20	21	95.2
355	1793	EARLHAM COLLEGE	20	20	100.0
356	3328	WEST CHESTER UNIV OF PENN	20	20	100.0
357	3924	UNIV OF WIS-STEVENS POINT	20	20	100.0
358	10230	UNIVERSITY OF ME-BANGOR	20	20	100.0
359	11716	SUNY REGENTS EXTNL DEGREE	20	120	16.7
360	2072	FROSTBURG STATE COLLEGE	19	19	100.0
361	2739	ITHACA COLLEGE	19	19	100.0
362	3362	SETON HILL COLLEGE	19	19	100.0
363	3955	UNIV OF WEST FLORIDA	19	387	4.9
364	1169	CLAREMONT GRADUATE SCHOOL	18	41	43.9
365	3788	SEATTLE PACIFIC UNIV	18	18	100.0
366	4661	HAMPSHIRE COLLEGE	18	78	23.1
367	1138	CALIF ST UNIV HAYWARD	17	135	12.6
368	2976	UNIV OF N C AT GREENSBORO	17	193	8.8
369	1141	CAL ST U DOMINGUEZ HILLS	16	65	24.6
370	1150	CALIF ST UNIV SACRAMENTO	15	93	16.1
371	2243	CENTRAL MICHIGAN UNIV	15	15	100.0

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
372	3388	VILLANOVA UNIVERSITY	15	201	7.5
373	2625	WILLIAM PATERSON COLLEGE	14	14	100.0
374	3691	MIDDLEBURY COLLEGE	14	14	100.0
375	1860	DRAKE UNIVERSITY	13	29	44.8
376	2701	COLGATE UNIVERSITY	13	59	22.0
377	2981	WESTERN CAROLINA UNIV	13	167	7.8
378	2358	MACALESTER COLLEGE	12	12	100.0
379	3083	MOUNT UNION COLLEGE	12	12	100.0
380	8784	PACE UNIVERSITY	12	91	13.2
381	2314	SAGINAW VALLEY STATE COL	11	11	100.0
382	3037	COLLEGE OF WOOSTER	11	32	34.4
383	1515	ROLLINS COLLEGE	10	10	100.0
384	1856	CORNELL COLLEGE	10	73	13.7
385	6967	BAYLOR UNIVERSITY	10	397	2.5
386	2236	ALMA COLLEGE	9	9	100.0
387	1385	FAIRFIELD UNIVERSITY	6	6	100.0
388	2423	MISSISSIPPI STATE UNIV	6	9,408	0.1
389	2603	DREW UNIVERSITY	6	53	11.3
390	2671	BARD COLLEGE	6	6	100.0
391	2732	HOFSTRA UNIVERSITY	6	52	11.5
392	2530	EASTERN MONTANA COLLEGE	5	5	100.0
393	8818	INDIANA UNIV OF PENN	4	7	57.1
394	1977	MURRAY STATE UNIVERSITY	3	27	11.1
			=======	=========	
			758,990	5,023,677	

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
1	8779	CORNELL UNIVERSITY	40,822	105,338	38.8
2	2178	MASS INST OF TECHNOLOGY	32,459	178,706	18.2
3	1317	UNIV OF CAL SAN DIEGO	25,662	104,083	24.7
4	1775	UNIV OF ILL URBANA	24,411	68,911	35.4
5	2707	COLUMBIA UNIV MAIN DIV	23,274	110,089	21.1
6	1305	STANFORD UNIVERSITY	22,961	160,274	14.3
7	1312	UNIV OF CAL BERKELEY	22,689	85,852	26.4
8	3798	UNIVERSITY OF WASHINGTON	21,198	136,883	15.5
9	1131	CALIFORNIA INST OF TECH	18,759	48,589	38.6
10	3895	UNIV OF WIS-MADISON	18,379	99,831	18.4
11	2230	WOODS HOLE OCNGRPHIC INST	18,372	39,705	46.3
12	9091	UNIVERSITY OF MICHIGAN	16,326	95,307	17.1
13	2290	MICHIGAN STATE UNIVERSITY	14,980	41,205	36.4
14	1315	UNIV OF CAL LOS ANGELES	14,531	110,057	13.2
15	3378	UNIV OF PENNSYLVANIA	14,469	94,154	15.4
16	1774	UNIVERSITY OF CHICAGO	13,842	68,703	20.1
17	2155	HARVARD UNIVERSITY	12,582	98,972	12.7
18	2627	PRINCETON UNIVERSITY	12,470	28,783	43.3
19	8731	INDIANA UNIVERSITY	11,484	35,123	32.7
20	2103	UNIV OF MD COLLEGE PARK	11,412	38,260	29.8
21	8732	PURDUE UNIVERSITY	11,223	41,892	26.8
22	3210	OREGON STATE UNIVERSITY	10,482	37,499	28.0
23	1739	NORTHWESTERN UNIVERSITY	10,432	42,864	24.3
24	8717	UNIVERSITY OF COLORADO	10,257	62,708	16.4
25	9555	SUNY AT STONY BROOK	10,181	29,770	34.2
26	1083	UNIVERSITY OF ARIZONA	10,062	43,380	23.2
27	3658	UNIV OF TEXAS AT AUSTIN	9,858	62,316	15.8
28	1328	UNIV OF SOUTHERN CAL	9,272	79,617	11.6
29	1320	UNIV OF CAL SANTA BARBARA	9,026	18,738	48.2
30	3401	BROWN UNIVERSITY	9,006	22,996	39.2
31	8813	PENNSYLVANIA STATE UNIV	8,934	64,372	13.9
32	1426	YALE UNIVERSITY	8,750	97,905	8.9
33	8802	OHIO STATE UNIVERSITY	8,125	48,339	16.8
34	2077	JOHNS HOPKINS UNIVERSITY	7,588	467,050	1.6
35	2221	UNIV OF MASS AT AMHERST	7,562	19,563	38.7
36	2894	UNIVERSITY OF ROCHESTER	7,363	60,157	12.2
37	3242	CARNEGIE-MELLON UNIV	7,338	27,650	26.5
38	2920	DUKE UNIVERSITY	7,112	62,074	11.5
39	3675	UNIVERSITY OF UTAH	6,984	45,427	15.4
40	1350	COLORADO STATE UNIVERSITY	6,684	25,002	26.7
41	8771	RUTGERS THE ST UNIV OF NJ	6,558	23,827	27.5
42	1535	UNIVERSITY OF FLORIDA	6,449	40,847	15.8
43	1313	UNIV OF CAL DAVIS	6,066	37,586	16.1
44	8815	UNIVERSITY OF PITTSBURGH	5,921	50,557	11.7
45	1536	UNIVERSITY OF MIAMI	5,912	27,880	21.2
46	3632	TEXAS A & M UNIVERSITY	5,765	31,072	18.6
47	3024	CASE WESTERN RESERVE UNIV	5,649	43,931	12.9
48	3414	UNIV OF RHODE ISLAND	5,564	12,093	46.0
49	2974	UNIV OF NC AT CHAPEL HILL	5,562	48,491	11.5
50	1489	FLORIDA STATE UNIVERSITY	5,159	12,506	41.3
51	2785	NEW YORK UNIVERSITY	4,965	55,028	9.0
52	1314	UNIV OF CAL IRVINE	4,893	26,798	18.3
53	1598	UNIVERSITY OF GEORGIA	4,843	23,165	20.9

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
54	1081	ARIZONA STATE UNIVERSITY	4,688	10,130	46.3
55	1610	UNIV OF HAWAII-MANOA	4,649	23,925	19.4
56	29094	UNIV OF ALASKA FAIRBANKS	4,609	9,033	51.0
57	2520	WASHINGTON UNIVERSITY	4,246	61,341	6.9
58	3745	UNIVERSITY OF VIRGINIA	4,213	30,279	13.9
59	3604	RICE UNIVERSITY	4,212	10,822	38.9
60	3223	UNIVERSITY OF OREGON MAIN	4,186	12,803	32.7
61	3754	VA POLYTECH INST & ST U	4,034	21,214	19.0
62	8819	UNIV OF SOUTH CAROLINA	3,850	8,694	44.3
63	2972	N C STATE UNIV AT RALEIGH	3,734	22,639	16.5
64	2803	RENSSELAER POLYTECH INST	3,674	12,638	29.1
65	1321	UNIV OF CAL SANTA CRUZ	3,523	6,390	55.1
66	1431	UNIVERSITY OF DELAWARE	3,411	9,515	35.8
67	8725	GEORGIA INSTITUTE OF TECH	3,356	38,460	8.7
68	2565	UNIV OF NEBRASKA-LINCOLN	3,302	9,605	34.4
69	9554	SUNY AT BUFFALO	3,212	19,270	16.7
70	1840	UNIVERSITY OF NOTRE DAME	3,191	9,436	33.8
71	3800	WASHINGTON STATE UNIV	3,147	16,772	18.8
72	8789	SYRACUSE UNIVERSITY	3,140	11,924	26.3
73	1892	UNIVERSITY OF IOWA	2,848	48,378	5.9
74	1316	UNIV OF CAL RIVERSIDE	2,778	10,028	27.7
75	2130	BOSTON UNIVERSITY	2,707	39,306	6.9
76	3652	U OF HOUSTON UNIV PARK	2,660	6,643	40.0
77	8718	UNIVERSITY OF CONNECTICUT	2,501	28,060	8.9
78	1869	IOWA ST U OF SCI & TECH	2,489	13,384	18.6
79	8745	LOUISIANA STATE UNIV	2,435	25,944	9.4
80	2835	SUNY AT ALBANY	2,349	9,862	23.8
81	2133	BRANDEIS UNIVERSITY	2,329	12,606	18.5
82	3535	VANDERBILT UNIVERSITY	2,209	35,338	6.3
83	2329	WAYNE STATE UNIVERSITY	2,161	14,282	15.1
84	2199	NORTHEASTERN UNIVERSITY	2,134	6,551	32.6
85	2807	ROCKEFELLER UNIVERSITY	2,098	29,484	7.1
86	8805	UNIVERSITY OF CINCINNATI	2,095	23,860	8.8
87	3530	U TENNESSEE KNOXVILLE	2,068	14,949	13.8
88	3289	LEHIGH UNIVERSITY	1,974	6,956	28.4
89	8761	UNIVERSITY OF MINNESOTA	1,951	72,494	2.7
90	8807	UNIVERSITY OF OKLAHOMA	1,940	11,569	16.8
91	2053	UNIV OF MAINE ORONO	1,918	6,224	30.8
92	1928	KANS ST U - AG & APP SCI	1,873	8,895	21.1
93	8744	UNIVERSITY OF KENTUCKY	1,754	16,268	10.8
94	2663	UNIVERSITY OF NEW MEXICO	1,729	33,842	5.1
95	2796	POLYTECHNIC INST OF N Y	1,691	4,739	35.7
96	3256	DREXEL UNIVERSITY	1,691	5,291	32.0
97	2688	CUNY CITY COLLEGE	1,679	5,333	31.5
98	3371	TEMPLE UNIVERSITY	1,649	17,281	9.5
99	29001	UNIVERSITY OF KANSAS	1,630	15,869	10.3
100	2699	CLARKSON COLLEGE OF TECH	1,608	3,265	49.2
101	1776	UNIV OF ILL CHICAGO	1,598	22,531	7.1
102	3677	UTAH STATE UNIVERSITY	1,564	17,416	9.0
103	2589	UNIV OF NEW HAMPSHIRE	1,526	9,006	16.9
104	3932	UNIVERSITY OF WYOMING	1,526	15,349	9.9
105	1371	UNIVERSITY GF DENVER	1,512	5,706	26.5
106	3827	WEST VIRGINIA UNIVERSITY	1,450	10,120	14.3

INSTITUTIONS RANKED BY FY 1984 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 3
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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
107	2573	DARTMOUTH COLLEGE	1,426	13,383	10.7
108	1691	ILLINOIS INST OF TECH	1,403	4,682	30.0
109	1155	SAN JOSE STATE UNIVERSITY	1,393	3,308	42.1
110	2517	UNIV OF MISSOURI ROLLA	1,367	3,688	37.1
111	1319	UNIV OF CAL SAN FRANCISCO	1,303	85,449	1.5
112	2654	N MEX INST MINING & TECH	1,251	4,890	25.6
113	9741	UNIV OF TEXAS AT DALLAS	1,228	4,892	25.1
114	1564	EMORY UNIVERSITY	1,215	23,621	5.1
115	1151	SAN DIEGO STATE UNIV	1,187	3,936	30.2
116	8773	NEW MEXICO STATE UNIV	1,187	26,660	4.5
117	2532	MONTANA STATE UNIVERSITY	1,182	5,179	22.8
118	1444	GEORGE WASHINGTON UNIV	1,150	15,122	7.6
119	8806	OKLAHOMA STATE UNIVERSITY	1,130	9,202	12.3
120	2516	UNIV OF MISSOURI COLUMBIA	1,079	17,810	6.1
121	8856	OREGON GRADUATE CENTER	1,025	10,163	10.1
122	8828	COLLEGE OF WILLIAM & MARY	1,006	2,829	35.6
123	3896	UNIV OF WIS-MILWAUKEE	983	2,298	42.8
124	1445	GEORGETOWN UNIVERSITY	903	14,463	6.2
125	3644	TEXAS TECH UNIVERSITY	855	5,619	15.2
126	2104	UNIV OF MD BALT PROF SCH	840	19,943	4.2
127	2029	TULANE UNIVERSITY	835	11,096	7.5
128	8001	UNIV OF ILLINOIS SYS OFF	793	2,130	37.2
129	8766	ST LOUIS UNIVERSITY	769	7,061	10.9
130	2903	YESHIVA UNIVERSITY	733	53,077	1.4
131	2568	UNIV OF NEVADA - RENO	726	5,265	13.8
132	8799	KENT STATE UNIVERSITY	726	1,842	39.4
133	1108	UNIV OF ARK FAYETTEVILLE	719	2,811	25.6
134	2292	MICHIGAN TECH UNIVERSITY	707	3,480	20.3
135	3696	UNIV OF VT & ST AGRIC COL	698	18,249	3.8
136	2836	SUNY AT BINGHAMTON	669	2,238	29.9
137	11618	U TEX HLTH SCI CTR HOUSTN	663	16,206	4.1
138	2128	BOSTON COLLEGE	656	4,098	16.0
139	2219	TUFTS UNIVERSITY	632	27,995	2.3
140	1424	WESLEYAN UNIVERSITY	628	2,036	30.8
141	8764	UNIVERSITY OF MISSISSIPPI	616	7,016	8.8
142	3613	SOUTHERN METHODIST UNIV	602	1,759	34.2
143	1737	NORTHERN ILLINOIS UNIV	570	1,236	46.1
144	3425	CLEMSON UNIVERSITY	563	5,709	9.9
145	1481	FLORIDA ATLANTIC UNIV	551	801	68.8
146	2620	UNIV OF MED & DENT OF N J	538	14,349	3.7
147	8803	OHIO UNIVERSITY	534	1,733	30.8
148	1437	CATHOLIC UNIV OF AMERICA	532	2,556	20.8
149	1348	COLORADO SCHOOL OF MINES	522	3,657	14.3
150	3470	S DAK SCH MINES & TECH	522	1,179	44.3
151	12305	BRIGHAM YOUNG UNIVERSITY	517	2,931	17.6
152	3659	U TEX HLTH SCI CTR S ANTO	515	18,562	2.8
153	9756	U MASS MED SCHL WORCESTER	513	14,767	3.5
154	2690	CUNY QUEENS COLLEGE	509	1,151	44.2
155	1434	AMERICAN UNIVERSITY	507	1,838	27.6
156	7026	CUNY MT SINAI SCH OF MED	502	26,796	1.9
157	1051	THE UNIVERSITY OF ALABAMA	498	1,652	30.1
158	1448	HOWARD UNIVERSITY	495	8,807	5.6
159	3863	MARQUETTE UNIVERSITY	491	1,219	40.3

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
160	1537	UNIV OF SOUTH FLORIDA	487	4,212	11.6
161	2978	WAKE FOREST UNIVERSITY	487	14,660	3.3
162	3370	SWARTHMORE COLLEGE	481	561	85.7
163	2689	CUNY HUNTER COLLEGE	468	2,108	22.2
164	1052	UNIV ALABAMA BIRMINGHAM	465	37,839	1.2
165	3660	U TEX HLTH SCI CTR DALLAS	455	32,949	1.4
166	2687	CUNY BROOKLYN COLLEGE	450	1,045	43.1
167	2233	WORCESTER POLY INSTITUTE	448	635	70.6
168	3656	UNIV OF TEX AT ARLINGTON	447	1,485	30.1
169	3735	VIRGINIA COMMONWLTH UNIV	445	21,686	2.1
170	12310	UNIVERSITY OF AKRON	445	1,377	32.3
171	8796	BOWLING GREEN STATE UNIV	442	788	56.1
172	1758	SOUTHERN ILL U-CARBONDALE	430	5,379	8.0
173	4063	CUNY GRAD SCH & UNIV CTR	424	1,064	39.8
174	1574	GEORGIA STATE UNIVERSITY	419	1,038	40.4
175	2139	CLARK UNIVERSITY	404	1,507	26.8
176	8296	MEDICAL COLLEGE OF WIS	391	11,637	3.4
177	1509	NOVA UNIVERSITY	385	494	77.9
178	2307	OAKLAND UNIVERSITY	383	2,295	16.7
179	4949	BAYLOR COL OF MEDICINE	375	39,340	1.0
180	3237	BRYN MAWR COLLEGE	372	548	67.9
181	1139	CALIF ST UNIV LONG BEACH	342	759	45.1
182	3639	TEXAS A & I UNIVERSITY	341	341	100.0
183	1626	UNIVERSITY OF IDAHO	338	15,595	2.2
184	2105	U OF MD BALTIMORE COUNTY	332	1,984	16.7
185	1140	CALIF ST UNIV LOS ANGELES	325	345	94.2
186	1551	ATLANTA UNIVERSITY	322	1,586	20.3
187	3131	UNIVERSITY OF TOLEDO	322	1,097	29.4
188	3642	TEXAS SOUTHERN UNIV	321	760	42.2
189	3944	UNIV OF P R-MAYAGUEZ	321	4,798	6.7
190	9266	NORTH DAKOTA STATE UNIV	318	4,496	7.1
191	6725	UNIV TENN CTR HEALTH SCI	314	9,752	3.2
192	2161	UNIVERSITY OF LOWELL	312	1,541	20.2
193	2210	SOUTHEASTERN MASS UNIV	311	629	49.4
194	1055	UNIV ALABAMA HUNTSVILLE	302	2,339	12.9
195	2758	MANHATTAN COLLEGE	296	400	74.0
196	2851	SUNY COL OF ENV SCI & FOR	296	873	33.9
197	8695	AUBURN UNIVERSITY	290	7,889	3.7
198	3728	OLD DOMINION UNIVERSITY	277	3,236	8.6
199	3714	HAMPTON INSTITUTE	275	992	27.7
200	1173	POMONA COLLEGE	261	517	50.5
201	3954	UNIV OF CENTRAL FLORIDA	261	590	44.2
202	3594	NORTH TEXAS STATE UNIV	255	1,514	16.8
203	2840	SUNY UPSTATE MEDICAL CTR	252	4,823	5.2
204	1002	ALABAMA A & M UNIVERSITY	248	2,632	9.4
205	1050	TUSKEGEE INSTITUTE	248	3,021	8.2
206	2410	JACKSON STATE UNIVERSITY	248	939	26.4
207	3490	FISK UNIVERSITY	248	384	64.6
208	3506	MEHARRY MEDICAL COLLEGE	248	1,335	18.6
209	3522	TENNESSEE STATE UNIV	248	2,443	10.2
210	1137	CALIF ST UNIV FULLERTON	247	469	52.7
211	8794	UNIVERSITY OF N DAKOTA	243	8,917	2.7
212	3636	TEXAS CHRISTIAN UNIV	242	561	43.1

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
213	2536	UNIVERSITY OF MONTANA	241	1,645	14.7
214	2621	N J INST OF TECHNOLOGY	231	454	50.9
215	3438	MED UNIV OF SO CAROLINA	228	8,280	2.8
216	2224	WELLESLEY COLLEGE	226	533	42.4
217	1710	LOYOLA UNIV - CHICAGO	221	2,465	9.0
218	3398	THE MEDICAL COL OF PENNA	221	4,824	4.6
219	3749	GEORGE MASON UNIVERSITY	217	321	67.6
220	2340	CARLETON COLLEGE	216	216	100.0
221	3274	HAVERFORD COLLEGE	216	298	72.5
222	1082	NORTHERN ARIZONA UNIV	215	707	30.4
223	2639	STEVENS INSTITUTE OF TECH	214	2,556	8.4
224	2842	SUNY COLLEGE BUFFALO	214	671	31.9
225	2923	EAST CAROLINA UNIVERSITY	208	1,434	14.5
226	2701	COLGATE UNIVERSITY	202	259	78.0
227	1414	TRINITY COLLEGE	197	223	88.3
228	2889	UNION COLLEGE (NY)	194	216	89.8
229	2895	VASSAR COLLEGE	192	461	41.6
230	3216	PORTLAND STATE UNIVERSITY	188	1,258	14.9
231	29297	MOREHOUSE SCHOOL OF MED	181	733	24.7
232	1692	ILLINOIS STATE UNIVERSITY	179	442	40.5
233	3086	OBERLIN COLLEGE	179	179	100.0
234	3265	FRANKLIN & MARSHALL COL	176	216	81.5
235	1347	COLORADO COLLEGE	175	175	100.0
236	2839	SUNY DOWNSTATE MED CTR	172	7,518	2.3
237	1171	HARVEY MUDD COLLEGE	170	378	45.0
238	2542	CREIGHTON UNIVERSITY	169	1,054	16.0
239	1154	SAN FRANCISCO STATE UNIV	166	1,017	16.3
240	1594	SPELMAN COLLEGE	166	204	81.4
241	1999	UNIVERSITY OF LOUISVILLE	163	3,017	5.4
242	3284	LAFAYETTE COLLEGE	162	183	88.5
243	2273	HOPE COLLEGE	159	415	38.3
244	2780	NEW SCH FOR SOC RESEARCH	155	370	41.9
245	1153	CALIF ST UNIV NORTHRIDGE	153	565	27.1
246	3661	UNIV OF TEXAS AT EL PASO	153	376	40.7
247	3802	WESTERN WASHINGTON UNIV	151	306	49.3
248	2222	UNIV OF MASS BOSTON	150	815	18.4
249	2229	WILLIAMS COLLEGE	150	248	60.5
250	9630	UNIV OF WIS-OSHKOSH	149	149	100.0
251	4661	HAMPSHIRE COLLEGE	147	192	76.6
252	2382	ST OLAF COLLEGE	140	299	46.8
253	2841	SUNY COLLEGE BROCKPORT	140	140	100.0
254	2518	UNIV OF MISSOURI KAN CITY	136	541	25.1
255	2975	UNIV OF N C AT CHARLOTTE	132	240	55.0
256	4952	U TEX MED BRNCH GALVESTON	130	13,124	1.0
257	1109	U OF ARKANSAS MED SCI CAM	129	2,732	4.7
258	2036	BATES COLLEGE	129	129	100.0
259	3630	PRAIRIE VIEW A & M UNIV	128	2,696	4.7
260	2722	FORDHAM UNIVERSITY	126	1,688	7.5
261	3487	EAST TENNESSEE STATE UNIV	125	431	29.0
262	9167	WRIGHT STATE UNIVERSITY	125	2,182	5.7
263	1353	FORT LEWIS COLLEGE	124	124	100.0
264	1143	CAL POLY ST U SAN LUIS OB	123	268	45.9
265	1379	CONNECTICUT COLLEGE	120	120	100.0

(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
266	2031	UNIV OF SOUTHWESTERN LA	117	125	93.6
267	3803	WHITMAN COLLEGE	117	117	100.0
268	2441	UNIV OF STHRN MISSISSIPPI	115	626	18.4
269	2141	COL OF THE HOLY CROSS	112	143	78.3
270	1326	UNIVERSITY OF SANTA CLARA	111	509	21.8
271	3367	ST JOSEPH'S UNIVERSITY	110	355	31.0
272	3919	UNIV OF WIS-LA CROSSE	110	110	100.0
273	2115	AMHERST COLLEGE	107	687	15.6
274	2519	UNIV OF MISSOURI ST LOUIS	107	528	20.3
275	3037	COLLEGE OF WOOSTER	105	127	82.7
276	7022	CUNY LEHMAN COLLEGE	105	169	62.1
277	3647	TRINITY UNIVERSITY	104	138	75.4
278	1538	UNIVERSITY OF TAMPA	102	102	100.0
279	1786	BALL STATE UNIVERSITY	100	258	38.8
280	2360	MANKATO STATE UNIVERSITY	100	100	100.0
281	29100	UNIVERSITY OF D C	100	818	12.2
282	1138	CALIF ST UNIV HAYWARD	94	239	39.3
283	3217	REED COLLEGE	92	556	16.5
284	9635	FLORIDA INTERNATIONAL U	92	488	18.9
285	3474	UNIV OF SOUTH DAKOTA	90	470	19.1
286	6967	BAYLOR UNIVERSITY	90	503	17.9
287	3744	UNIVERSITY OF RICHMOND	87	199	43.7
288	3955	UNIV OF WEST FLORIDA	87	212	41.0
289	1579	MEDICAL COL OF GEORGIA	85	6,730	1.3
290	3434	FURMAN UNIVERSITY	85	85	100.0
291	8155	EVERGREEN STATE COLLEGE	85	85	100.0
292	2804	HARTFORD GRADUATE CENTER	84	84	100.0
293	2918	DAVIDSON COLLEGE	84	84	100.0
294	11711	UNIV HOUSTN CLR LAKE CITY	84	290	29.0
295	2668	ALFRED UNIVERSITY	83	83	100.0
296	3238	BUCKNELL UNIVERSITY	81	131	61.8
297	10115	U OF TEXAS AT SAN ANTONIO	81	766	10.6
298	2696	CUNY NY CITY TECH COL	80	418	19.1
299	3185	UNIVERSITY OF TULSA	80	947	8.4
300	3624	STEPHEN F AUSTIN ST UNIV	80	312	25.6
301	2423	MISSISSIPPI STATE UNIV	78	7,947	1.0
302	1671	DE PAUL UNIVERSITY	76	118	64.4
303	2015	UNIVERSITY OF NEW ORLEANS	76	412	18.4
304	3127	UNIVERSITY OF DAYTON	76	17,938	0.4
305	3651	UNIVERSITY OF DALLAS	76	76	100.0
306	11716	SUNY REGENTS EXTNL DEGREE	76	127	59.8
307	2078	LOYOLA COLLEGE	75	75	100.0
308	8770	FAIRLEIGH DICKINSON UNIV	67	743	9.0
309	9060	BETHEL COLLEGE & SEMINARY	66	66	100.0
310	4882	OREGON HLTH SCIENCES UNIV	65	9,947	0.7
311	2739	ITHACA COLLEGE	64	64	100.0
312	8724	MERCER UNIVERSITY	62	183	33.9
313	1674	EASTERN ILLINOIS UNIV	61	61	100.0
314	1249	OCCIDENTAL COLLEGE	60	142	42.3
315	1329	UNIVERSITY OF THE PACIFIC	60	552	10.9
316	2192	MOUNT HOLYOKE COLLEGE	60	218	27.5
317	2241	CALVIN COLLEGE	59	59	100.0
318	3491	MIDDLEBURY COLLEGE	58	58	100.0

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
319	1057	UNIV OF SOUTH ALABAMA	57	4,831	1.2
320	2728	HAMILTON COLLEGE	57	142	40.1
321	2153	GORDON COLLEGE	55	55	100.0
322	3924	UNIV OF WIS-STEVENS POINT	55	67	82.1
323	2849	SUNY COLLEGE PLATTSBURGH	54	209	25.8
324	3945	UNIV OF P R-MED SCI CMPUS	54	3,043	1.8
325	2358	MACALESTER COLLEGE	52	52	100.0
326	3799	WALLA WALLA COLLEGE	51	175	29.1
327	2887	ALBANY MEDICAL COLLEGE	50	6,859	0.7
328	2732	HOFSTRA UNIVERSITY	49	117	41.9
329	1641	BRADLEY UNIVERSITY	48	48	100.0
330	3884	RIPON COLLEGE	48	48	100.0
331	7737	MED COL OF OHIO AT TOLEDO	48	2,785	1.7
332	8800	MIAMI UNIVERSITY (OHIO)	48	384	12.5
333	3229	ALBRIGHT COLLEGE	47	47	100.0
334	1147	CALIF STATE UNIV FRESNO	45	169	26.6
335	2632	SETON HALL UNIVERSITY	45	193	23.3
336	3301	MORAVIAN COLLEGE	45	45	100.0
337	3050	JOHN CARROLL UNIVERSITY	43	179	24.0
338	2038	BOWDOIN COLLEGE	42	219	19.2
339	10875	NORWICH UNIVERSITY	42	42	100.0
340	29040	CUNY COL STATEN ISLAND	41	41	100.0
341	1616	BOISE STATE UNIVERSITY	40	117	34.2
342	2846	SUNY COLLEGE NEW PALTZ	38	38	100.0
343	2843	SUNY COLLEGE CORTLAND	37	52	71.2
344	1890	UNIV OF NORTHERN IOWA	35	35	100.0
345	2208	SIMMONS COLLEGE	35	64	54.7
346	2275	KALAMAZOO COLLEGE	35	40	87.5
347	2323	UNIVERSITY OF DETROIT	35	232	15.1
348	2628	RIDER COLLEGE	35	35	100.0
349	3258	DUQUESNE UNIVERSITY	35	35	100.0
350	3581	LAMAR UNIVERSITY	35	35	100.0
351	3778	GONZAGA UNIVERSITY	35	35	100.0
352	8772	EASTERN NEW MEXICO UNIV	35	35	100.0
353	2984	UNIV OF N C AT WILMINGTON	33	123	26.8
354	3694	ST MICHAEL'S COLLEGE	33	33	100.0
355	3835	BELOIT COLLEGE	33	50	66.0
356	1146	CALIF STATE UNIV CHICO	32	32	100.0
357	3279	JUNIATA COLLEGE	32	32	100.0
358	3837	CARDINAL STRITCH COLLEGE	32	32	100.0
359	2330	WESTERN MICHIGAN UNIV	31	147	21.1
360	3509	MEMPHIS STATE UNIVERSITY	31	531	5.8
361	2461	DRURY COLLEGE	30	45	66.7
362	2737	IONA COLLEGE	30	30	100.0
363	3979	COLUMBIA U TEACHERS COL	30	367	8.2
364	7993	CALIF ST COL BAKERSFIELD	30	30	100.0
365	2259	EASTERN MICHIGAN UNIV	29	277	10.5
366	2379	ST JOHN'S UNIVERSITY	29	29	100.0
367	1950	WICHITA STATE UNIVERSITY	28	689	4.1
368	2209	SMITH COLLEGE	28	119	23.5
369	1170	CLAREMONT MCKENNA COLLEGE	27	27	100.0
370	1927	EMPORIA STATE UNIVERSITY	26	26	100.0
371	1954	BELLARMINE COLLEGE	26	26	100.0

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
372	1233	SACRAMENTO CITY COLLEGE	25	25	100.0
373	1633	AUGUSTANA COLLEGE	25	25	100.0
374	2976	UNIV OF N C AT GREENSBORO	25	220	11.4
375	1262	POINT LOMA COLLEGE	23	23	100.0
376	3327	SLIPPERY ROCK UNIV OF PA	22	22	100.0
377	5015	UNIV OF WIS-PARKSIDE	22	155	14.2
378	7206	UNIV OF P R-CAYEY U COL	22	22	100.0
379	1963	EASTERN KENTUCKY UNIV	21	55	38.2
380	1363	REGIS COLLEGE	20	20	100.0
381	2156	RADCLIFFE COLLEGE	20	150	13.3
382	2353	GUSTAVUS ADOLPHUS COLLEGE	20	20	100.0
383	2981	WESTERN CAROLINA UNIV	20	116	17.2
384	4766	CUNY BERNARD BARUCH COL	20	60	33.3
385	3615	SOUTHWEST TEXAS ST UNIV	18	18	100.0
386	29020	UNIV HAWAII AT HILO	18	18	100.0
387	1150	CALIF ST UNIV SACRAMENTO	17	80	21.2
388	1788	BUTLER UNIVERSITY	17	254	6.7
389	3529	U TENNESSEE CHATTANOOGA	17	104	16.3
390	3645	TEXAS WESLEYAN COLLEGE	17	17	100.0
391	3899	UNIV OF WIS-GREEN BAY	17	17	100.0
392	1860	DRAKE UNIVERSITY	16	21	76.2
393	3713	HAMPDEN-SYDNEY COLLEGE	15	15	100.0
394	2503	SOUTHWEST MISSOURI ST U	14	14	100.0
395	3923	UNIV OF WIS-RIVER FALLS	13	13	100.0
396	3625	SUL ROSS STATE UNIVERSITY	11	21	52.4
397	1479	EMBRY-RIDDLE AERO UNIV	10	54	18.5
398	2006	GRAMBLING STATE UNIV	10	10	100.0
399	2243	CENTRAL MICHIGAN UNIV	10	76	13.2
400	2591	PLYMOUTH ST COL-UNIV N H	9	9	100.0
401	2829	ST LAWRENCE UNIVERSITY	9	9	100.0
402	2823	ST JOHN'S UNIVERSITY (NY)	8	186	4.3
403	1793	EARLHAM COLLEGE	7	7	100.0
404	3753	VIRGINIA MILITARY INST	7	22	31.8
405	2814	SKIDMORE COLLEGE	6	6	100.0
406	2847	SUNY COLLEGE ONEONTA	5	89	5.6
407	3523	TENN TECHNOLOGICAL UNIV	5	317	1.6
408	3423	CITADEL MILITARY COL S C	3	7	42.9
409	7109	SUNY COL AT OLD WESTBURY	3	3	100.0
			=======	=========	
			858,860	5,622,768	

QUESTIONS SUBMITTED BY SENATOR LEAHY

AGRICULTURAL AND BIOCHEMICAL ENGINEERING

In its Outlook For Science and Technology for 1985, the National Academy of Sciences warned that the "...spectacular advances in molecular biology and the techniques of genetic engineering..." have not been applied to Agricultural research.

You have stated that NSF plans to support:

- Five - ten engineering research centers
- Thirty Industry/University cooperative research centers
- Four Biotechnology centers

Question: Are any of these centers dedicated to solving the problems identified by the National Academy of Sciences?

Answer: The engineering research centers focus on engineering questions and on basic work related to relatively specific engineering problems. As such they are in direct response to recommendations made by the National Academy of Engineering. These centers will not be focusing on research related to agricultural science.

Both the industry/university cooperative research centers and the biotechnology centers are open to proposals dealing with the application of modern genetic techniques to agriculture. With the current industrial emphasis in this area, it is very likely that such proposals in this area will be forthcoming. We have already received one industry/university cooperative research project proposal dealing with agricultural science.

In addition, there have been several university groups who have requested information about application procedures for the biotechnology centers. If a competitive proposal is submitted in this research area, we would be pleased to provide funding.

Question: Would the Foundation be willing to work with this committee in developing a response to this recommendation of the National Academy of Sciences?

Answer: We would be delighted to meet with the Committee staff, to share our thoughts and ideas with them, and to work together to develop a consistent and effective policy to deal with this clearly identified need.

DOES NSF MATTER

Your budget documents note that the total budget is only 3 percent "of the total national effort in research and development".

Question: If NSF is such a small factor in overall R&D, would it really matter to the nation as a whole if it were abolished or cut in half?

Answer: It would matter a great deal to this nation's economic competitiveness, national security and the general well-being of U.S. public if the NSF were abolished or its funding cut in half.

Contrary to other countries, about half of all U.S. basic research activity takes place in colleges and universities. Although the NSF accounts for less than 3 percent of total Federal support for research and development, we provide nearly 17 percent of Federal basic research dollars and about 25 percent of the Federal support for basic research at colleges and universities.

Our support for basic research at academic institutions allows researchers to tackle problems that require longer-term investments, not directly driven by the need for specific applications. In this sense, we complement the support provided by the more mission-oriented Federal agencies.

Equally important, NSF support for basic research in academic institutions is an investment that ensures the current and future production of top quality scientists and engineers for academia, industry, and government. Our programs support promising ideas and people across all fields of science and engineering, and it is from support such as this that genuine breakthroughs occur, innovation is stimulated, and Nobel prizes are earned.

THREE BIG INCREASES

You are proposing three big increases in 1987

- Biotechnology - up $30 million - 23%
- Computational Science - up $27 million - 47%
- Global Geoscience - up $18 million - 105%

Question: How can you justify this increase of $65 million with the huge deficit we now have?

Answer: Biotechnology, computational science, and global geoscience are all areas of extraordinary scientific opportunity. Advances in these areas have a high potential for long-term economic payoff. Research in these topics is multidisciplinary, requiring strong collaborative efforts and sophisticated equipment. Additional research funding can have a large multiplier effect by providing for the establishment of new institutional arrangements and capabilities to encourage collaboration that will accelerate and intensify scientific productivity.

The commercialization of biotechnology in the U.S. is heavily dependent on a broad fundamental research base. Future advances will require scientists and engineers with multi-disciplinary training and skills, and this kind of training will be a central focus of NSF support of biotechnology-related research.

Advanced research in many areas of science and engineering is increasingly dependent on computational methods. However, until recently, the U.S. academic research community had limited opportunity to use this powerful approach. The 1985 NSF initiative in advanced scientific computing made very powerful computers more widely available to academic researchers. The NSF computational science emphasis is intended to complement and extend these activities by providing support broadly across all research disciplines in academic institutions, with emphasis on collaborative, multidisciplinary approaches.

Global geosciences, which involves studies of the interrelatedness of the atmosphere, oceans, biosphere, and solid earth is now a well recognized field and is ripe for major advances. Recent developments of earth-based and satellite observational instrumentation, the emergence of sophisticated modeling and computational methods, and the availability of high-speed, high-volume communications capabilities set the stage for investigations and studies that were previously impossible. The proposed NSF activities in this area are part of major international efforts to understand natural phenomena that can have a profound impact on the public welfare and world economic conditions. Increased knowledge of the earth's processes can lead to more reliable predictions of natural events such as the El Nino oceanic/atmospheric phenomenon, earthquakes, and volcanic eruptions.

INDUSTRY RESEARCH UP

Between 1985 and 1987, NSF support to private industry is up 20 percent, while support for university research is up far less -- 13 percent.

Question: In light of the major tax cut given the private sector in the 1981 tax cuts, why is NSF's support for private research going up?

An analysis of the support to industrial performers shows that this gross percentage increase is misleading. In the Research and Related Activities appropriation of the Foundation for example, the increase from FY 1985 to FY 1987 is $6.2 million or 19.3%. In the disciplinary research program areas, support to industrial performers is actually down. The increases are found in two areas: Small Business Innovation Research ($4.7 million or 21.7%) which is a Congressionally-mandated program and Advanced Scientific Computing ($2.7 million or 29.3%). With respect to this latter increase, it represents awards to commercial vendors for the provision of supercomputer time to academic researchers.

The other area of increased support to industrial performers is in the U.S. Antarctic Program appropriation (22.2%). The bulk of the increased funds here is for construction and refurbishment of laboratory space at the Antarctic facilities. This work will be performed under contract.

QUESTIONS SUBMITTED BY SENATOR D'AMATO

Your FY 87 Budget request for Science and Engineering Education (SEE) is $89 million, which is $1.95 million over your FY 86 plan. The FY 86 Budget included a carryover of $31.5 million.

Question: What portion of these funds was deferred and what plans, if any, do you have for the carryover or undeferred balance for science and Engineering?

Answer: There are no deferred funds in the request for FY 1987. Further we plan to obligate the entire $87 million in the FY 86 Current Plan.

Question: What initiatives have you planned for the continued scientific and engineering advancement in our universities and colleges?

Answer: In the Science and Engineering Education request $7.5 million has been included for the College Science Instrumentation Program (CSIP). In the research portion of the budget an increment of $11 million has been included to expand opportunities for undergraduate faculty and students to become involved in the research process. In total at least $63 million is proposed for undergraduate research and education activities.

Question: Could you provide us with some examples of programs you have funded in the Precollege Science and Engineering Programs?

Answer: The Division of Teacher Preparation and Enhancement supports a variety of projects designed to provide models for good teaching, for the preservice preparation of teachers, for the in-service continuing professional development of teachers, and for linking isolated resources into productive networks for their exchange; these provide the personnel and context for maintaining and continuously renewing excellent education in mathematics, science, and technology.

Presidential Awards for Excellence in Science and Mathematics Teaching

This program honors outstanding secondary school science and mathematics teachers as a means to raise the prestige of the profession as a whole and supports the continuing creative teaching of the awardees. Each teacher becomes a National Science Foundation grantee with a $5,000 grant to be used under his/her direction to enhance science or mathematics education.

Teacher Preparation Program

"A Model to Improve Preservice Elementary Science Teacher Development" is a project to develop a prototype integrated physical sciences course for prospective elementary school teachers. It has been developed cooperatively by the departments of physics, chemistry, geology, and science education at Washington State University to help prospective teachers acquire the knowledge and skills to cover fundamental topics in astronomy, physics, chemistry, and earth sciences and the skill to relate them to the everyday world. (MDR-8470609: $142,273 first year; $122,675 second)

"EQUALS in Computer Technology" addresses the critical issue of equal access of all students to computer technology in the classroom. The focus is on development and evaluation of training materials designed to assist teachers in grades K-12 in ensuring equitable use of classroom computers and reaching the female and minority students now not participating in numbers proportional to their numbers in the school population. Lawrence Hall of Science, University of California, Berkeley, has produced pilot materials that will be evaluated with the aim of improving them and informing their further development. (MDR-8470529: $114,921 first year; $122,258 second)

Teacher Enhancement Program

"STRIVE: Science Teachers Research Involvement for Vital Education" is a project of Oak Ridge Associated Universities that will bring 60 junior and senior high school teachers to Oak Ridge and associated laboratories to engage in full-time energy-related research during the summer. There will be weekly sessions at which teachers will use their new knowledge to create enrichment materials for their teaching. There will be several complementary academic year activities including mentor visitations and lectures in the teachers' classrooms, the participants serving as in-residence resource teachers for their peers, and forums for all the teachers involved. Participants will be prime candidates for Tennessee's new career ladder promotions. (TEI-8550505: $158,900 first year; $141,000 second; $90,000 third)

"Workshop for Teachers from American Indian Schools" will bring 30 science teachers for American Indian Schools to a 5-week workshop at the Colorado School of Mines to receive up-to-date science content as well as theories and strategies appropriate for instructing American Indian students. Members of the American Indian Science and Engineering Society (AISES) will be instructors and incorporate traditional Indian values in the instructional process. Participating teachers will take part in special programs at AISES and NSTA national meetings in order to increase their own sense of professionalism and to disseminate ideas from the project to a wider audience of teachers, scientists, and engineers. (TEI-8550184: $190,850 first year; $210,000 second)

"Teacher Development in Secondary School Science Research" is a project developed by the Broward County (Florida) school system that will involve 30 secondary school teachers in a development program designed to increase the number of high school students interested in a career in science and engineering through a meaningful high school course in science research. A consortium of 10 industries and laboratories, in addition to Florida Atlantic University and the University of Florida-Davie, will provide the hands on experience for the teachers and subsequently for the students. A pilot program on a smaller scale has worked well to produce a cadre of enthusiastic teachers and students who did worthy science projects. This project is an experiment to see whether the idea can be extended and "codified" beyond this dedicated nucleus. (TEI-8470510: $76,753 for one year)

"Honors Program and Regional Teacher Development in Mathematics and Science" will provide enhancement and professional development for 16 certified and 40 uncertified New Hampshire secondary mathematics and science teachers. The project is based on careful analysis and rationale and a scholarly, yet practical, approach to building, evaluating, refining, and documenting a model for the continuing education of teachers. The 16 "teacher specialists" will participate for 3 years with their intensive training in the first year. They will then conduct mini-courses throughout the state and work closely with university scientists and mathematicians to develop and implement the second and third year summer and academic year workshops for 40 "conversion teachers." Detailed assessments will be made to obtain longitudinal indicators of teacher growth and quality course materials will be produced and made available to other sites. Excellent cooperation among schools, the state, and the University of New Hampshire has led to considerable cost sharing; about 50% of the total cost will be provided from non-NSF sources. (TEI-8550191: $71,049 first year; $148,000 second; $152,000 third)

Science and Mathematics Education Networks Program

"Exporting Success at the Grassroots Level -- Elaboration and Expansion of the SECME Model Through Support of Local Beacon School Networks in the Secondary Schools" is a project to expand the pre-college engineering program (developed with funding from private foundations and business) operated by the Southeastern Consortium for Minorities in Engineering, Inc. (SECME). The program prepares and motivates minority and non-minority students in predominantly minority secondary schools for careers in engineering, mathematics, and science. Specially trained teachers use applications-oriented curriculum modules to apply concepts in mathematics and science to engineering problems. The project will use a Master Teacher Network (teachers already trained to use the program) at a series of strategically located Beacon Schools to provide assistance and training, team building workshops, meetings, newsletters, and continuous and coherent support to teachers at nearby schools who will introduce the SECME program in this second tier of schools. Evaluation will be carried out throughout the project to track its effects on students (and teachers) and to document the accomplishments and problems associated with this secondary dissemination model for broader diffusion of the program. (TEI-8550247: $123,304 first year; $199,136 second; $200,000 third)

The Division of Materials Development, Research and Informal Science Education supports research and development activities designed to improve instructional materials and methods used in elementary and secondary school classrooms and informal educational settings.

Instructional Materials Development Program

"Adapting the Mechanical Universe: Materials for Use in High

Schools" is a college-level physics course for national television currently under development at Caltech supported by a $5 million grant from the Annenberg/CPB Project. The purpose of this project is to continue production of videotape adaptations and print materials based on The Mechanical Universe for use in high schools, and to conduct regional workshops on use of the materials. (MDR 85-50178; FY '85 $350,505; FY '86 $338,000)

Applications of Advanced Technologies Program

"The Intelligent Tutors for Elementary and Middle School Mathematics" provides theoretical foundations and prototype materials for improving the teaching of mathematical concepts and problem solving to elementary and middle school children. A set of graphic microworlds and prototype intelligent coaches will be built for the rational number system and for story problems, two topics in the school curriculum that are both pivotal for future learning and known to be difficult to teach. (FY '85 $301,406; FY '86 $309,986; FY '86 $321,969)

Research in Teaching and Learning Program

"A Longitudinal Study of the Acquisition of Science Concepts in Elementary School" has these objectives: 1) to track students' acquisition of scientific concepts from their home and school environments from kindergarten through fifth grade, 2) to assess students' knowledge and reasoning in several scientific domains generally with a norm-referenced measure, and, more specifically, with new measures which utilize findings about specific science domains, and 3) to analyze the data from the home environment, textbooks, and classroom instruction to produce a causal model to explain how students acquire science concepts. (FY '86 $84,968)

Informal Science Education Program

"'3-2-1 Contact,' A Children's Television Series About Science and Technology" ISE has led in providing federal support for planning, development and production of the daily children's science television series, "3-2-1 Contact." The program has been aired twice daily (for early evening home viewing and in-school use) and has proven extremely popular. In the first 13-week season it reached some 23 million at-home viewers, including six million homes without children. It's fourth season compared favorably with the first, reaching 12 million viewers in four weeks. (FY '84 $3,000,000; FY '85 $2,000,000; FY '86 $2,755,500; FY '87 $1,800,000; FY' 88 $1,900,000).

Question: What types of Precollege Science, Mathematics, and Engineering Programs have you scheduled for fiscal year 1987?

Answer: The Division of Teacher Preparation and Enhancement will stress projects that: make effective use of the talents of outstanding teachers; bring about continuing colleague-colleague interactions among scientists, mathematicians, educators, and teachers; involve all the members of the community that have a stake in the excellence of the science and mathematics education provided elementary and secondary students; prepare and support beginning teachers in both the content and methods needed for effective teaching; and bring about the necessary linkages for information and resource exchange in the science and mathematics education community. The emphasis is on coherence, continuity, and consistent support for the programmatic directions put in place during the past year-and-one-half, in order to attract the best and most productive scientists, mathematicians, science educators, mathematics educators, and teachers to develop and propose creative projects that will provide the personnel and context for maintaining and continuously renewing excellent education in mathematics, science, and technology.

The Division of Materials Development, Research and Informal Science Education plans to emphasize activities in the following areas in FY 87.

Applications of Advanced Technologies projects activities include development, testing and evaluation of advanced computer-based systems for precollege mathematics and science; the development of mechanisms to facilitate the widespread use of these products and concepts -- for example, networks and authoring systems.

Research in Teaching and Learning project activities include research on teaching and learning in specific disciplinary and knowledge domains (chemistry, physics, mathematics, biology, computer science, etc.); on the processes by which students learn to solve problems in logic, mathematics, and science; research on factors that influence the quality and effectiveness of instruction in science and mathematics.

Informal Science Education supports projects that help to provide a rich and stimulating environment for informal learning, for a wide variety of audiences, in a cost-effective manner; supports activities in a variety of media — broadcasting, museums, clubs, and other sources of direct science experience.

In our fourth program area, Instructional Materials Development, in addition to supporting more projects like those we are supporting in FY 1986, we plan to focus on more narrowly defined target areas such as the two described below:

Elementary mathematics: The Division of Materials Development, Research and Informal Science Education is inviting proposals for projects that will explore the consequences of the availability of calculators and computers for the elementary mathematics (K-6) curriculum.

Elementary science: Proposals are sought for projects that will improve the content, increase the role of the child as an active agent in the learning process, and lead to an increase in the time allotted to science instruction in elementary schools. We seek to foster a number of exemplary programs that can serve as alternative real-world models for schools and systems that are eager to change.

You have placed special emphasis on several programs for fiscal year 1986. Included among these programs is your interest in broadening participation in Science and Engineering Research and Education.

Question: What states do you plan on assisting, how did you determine that those States were in need of assistance, and what specific types of assistance and funding do you plan on providing to the States you have chosen?

Answer:

o The twelve jurisdictions of Alabama, Idaho, Kentucky, Louisiana, Mississippi, Nevada, North Dakota, Oklahoma, Puerto Rico, South Dakota, Vermont and Wyoming have already received planning awards from NSF and are currently competing for up to eight implementation awards under the Experimental Program to Stimulate Competitive Research (EPSCoR). The proposal review process will be carried out from March 15-June 1, 1986, with first year awards being made in September and October, 1986.

o These twelve participants in the EPSCoR program were selected on the basis of their low ranking on a series of indicators of success in securing Federal research support, excluding the five states that received funds in the first round of EPSCoR awards (Arkansas, Maine, Montana, South Carolina and West Virginia). The following quantitative indicators were used to establish the rank order of all states:

-Total NSF obligations (FY 1981-83), as a measure of competitiveness in basic research principally at academic institutions.

-Total Federal R&D obligations to universities and colleges (FY 1980-82), as a measure of the state's overall academic R&D capability.

-Federal R&D obligations per academic scientist and engineer, as a measure of relative competitiveness of the faculty.

-NSF obligations per academic scientist and engineer (FY 1984), as a measure of the relative competitiveness of the faculty for basic research funds.

-Federal obligations per 1,000 population.

-NSF obligations per 1,000 population.

o Eight jurisdictions will be selected to receive awards on the basis of peer review of their implementation plans. The EPSCoR awards of up to $3 million over a five-year period are to be matched by comparable state contributions to the EPSCoR effort, so that the total available program funds will be of the order of or greater than $6 million per state for the five-year grant period.

- EPSCoR is designed to facilitate self-improvement; therefore the responsibility for program development and execution rests with the state EPSCoR committees, their chairpersons and project directors. Any justifiable approach toward improving the research competitiveness of individual scientists or engineers, as determined by peer review prior to the grant award, is allowed within the EPSCoR effort of each state. Research improvement activities may be organized around the development of individual scientists or engineers, one or more science or engineering department(s) or interdisciplinary and multidisciplinary research areas.

- EPSCoR funds are mainly used for exploratory research or initiation on new research areas, research instrumentation or facilities, and acquiring materials and supplies. In the area of personnel, funds are used to hire scientists and engineers either as staff or as consultants. Support is also given for faculty to attend professional meetings and seminars, exchange programs and sabbaticals.

COMPUTER GRAPHICS

Computer Graphics technology is an emerging advanced technological field of research and development. The benefits of this technology to the U. S. is enormous; it has the potential of providing scientific, defense and economic benefits for our Nation.

Question: Could you provide some examples of what NSF has done in this field or what activities you plan to undertake in the future concerning computer graphics technology?

Answer: The Division of Computer Research, and the Office of Advanced Scientific Computing, all have strong, active programs in computer graphics.

The Division of Computer Research at NSF supports fundamental research in a number of important areas of computer graphics. One such area is computational geometry. The interesting real world problems to which computational geometry can be applied often concern objects which are curved or concave. For example, solid modeling systems build objects by integrating together surface patches which are defined via bicubic splines or pieces of cylinders, cones and spheres. Motion planning problems that need to be solved to enable robotics to progress typically involve motion of curved objects through barriers having curved shapes.

In designing a new building, an architect often builds a model in order to understand how the building will look and how its various parts relate to each other. Computer graphics are being used increasingly to represent the planned building and to allow the architect to view the building from various vantage points. One aspect of current computer graphics research is the production of realistic images of such non-existent scenes.

The control of articulated motion in a three dimensional environment is important to the future development of robotics. Current research is experimenting with embedding rules of mental behavior to control global motion which could be used in robotics to allow a robot to plan its own paths around or in conjunction with other robots and objects in the environment without explicit external control.

Computer Engineering supports a Pixel-planes project. Recently a working prototype computer graphics system based on high-performance, custom-designed, Very Large Scale Integrated (VLSI) chips has been demonstrated. The system contains 32 custom-designed chips, each with 30,000 transistors performing 10 million micro-instructions per second. The problem of generating realistic digital images in real time as fast as the human user can interact with them is addressed.

The Office of Advanced Scientific Computing (OASC) is presently supporting research and development in computer graphics technology in two areas:

- NSF is currently planning to provide access to a state-of-the-art computer graphics facility to all the supercomputer users via a CRAY X-MP/22 supercomputer. Already researchers have used this software to the Digital facility to: simulate the origins of the universe, improve radio astronomy imaging, conduct a 15-year study of high pressure anomalies in the Southern Hemisphere, and explain the behavior of certain stellar objects.

- In another NSF-sponsored national supercomputer effort the development of graphics capability is provided along three fronts. One is under the work supported by the Division of Computer Research above. A second endeavor is the implementation and further development of state-of-the-art commercial software. In this case the center is involved in providing computer graphics to all scientists and engineers who wish to manipulate their data within an intelligent workstation environment. The third endeavor is formally a part of the IBM hardware and software development.

The OASC is currently exploring ways to implement these and other advanced computer graphics programs into all of our national resources. In the future OASC is planning a strong and growing effort in advancing the state-of-the-art in graphics and imagery.

Your Notice to Presidents of Universities and Colleges and Heads of other National Science Foundation Grantee organizations of February 13, 1986, (Notice Number 100) authorizes the reduction of up to 10% in new awards, amendments and renewals of continuing grants, contracts and cooperative agreements.

Question: How do you plan on assisting grantees that had a commitment for funding, but will not be funded?

Answer: We do not plan to revoke any awards already made. However, the funding level for already committed grants may have to be renegotiated. All reductions will be negotiated on a case by case basis. This means that the NSF program manager, the Principal Investigator, and the representative of the grantee institution usually the business office, will jointly decide how the reduction is to be made. It might involve a change in the scope or timing of the research project; the university might provide a larger proportion of cost sharing; or the required cut might be made in a particular budget item or on a bottom-line basis. No commitment may be reduced by more than 10%, most will face smaller reductions; in no case will an award be entirely revoked.

Question: Will the reduction be the same for each of these types of commitments or do you plan on reducing some by 10% and others by less, for example?

Answer: Within any given category--renewals, contracts, new grants, and others--the aggregate reductions will total roughly 4.3% of the total funds spent through that kind of instrument. But on an award-by-award basis, reductions may range from zero to 10%. This gives program managers flexibility to make the reductions with as little disruption as possible. As indicated in the response to the preceding question, each reduction will be separately negotiated so that special considerations can be appropriately weighed.

Question: What will be the reduction amounts in each category that you presently fund?

Answer: We have submitted for the record a revised current plan which shows the post-sequestration funding level for each program element in the Foundation. Each general category--grants, contracts, and other forms of agreements-- will take a proportionate share of reductions.

Your notice to all Grantees also specifies that you might decline a number of proposals worthy of support in order to make reductions of the sequester order.

Question: How will you determine which proposals to decline?

Answer: The Foundation always receives many more worthwhile proposals than we are able to fund. In FY 1985, we received more than 37,000 proposals, only 14,000 of which were funded. The 4.3% sequestration just makes the competition more intense. Each program manager must determine how many proposals can be supported within the funds available after sequestration. Four criteria are used to judge all NSF proposals: competence of the performer(s); intrinsic merit of the research; utility or relevance of the research; and the effect of the project on the infrastructure of science and engineering.

Question: Is there a particular date after which you will not accept applications, or what specifically will be your criteria for denial of applications to accomplish these savings?

Answer: Most NSF programs accept proposals throughout the year. A few special programs, such as the Graduate Fellowships, have deadlines; these have nothing to do with Gramm-Rudman constraints--they just define the cutoff for an annual competition. All awards made in FY 1986 are subject to Gramm-Rudman reductions, regardless of when the proposals were submitted. We will not know whether similar reductions will apply in FY 1987 until the appropriations process has been completed.

QUESTIONS SUBMITTED BY CHAIRMAN HATFIELD

Regarding the Merit Review System for University proposals:

Question: What percentage of your FY 87 research budget will be devoted to research conducted by universities; how many total dollars does that represent; and how does FY 87 universit, research compare to FY 81 - FY 86?

Answer: It is estimated that 78 percent of the Foundation's 1987 Research and Related Activities budget, or $1,158 million will be devoted to research conducted by universities. For the period 1982 - 1986 the following table summarizes NSF support of university based research:

Year	$ Millions	% of total
1986	1,051	78
1985	1,014	77
1984	885	77
1983	790	80
1982	725	80

In addition, awards to university-based consortia (technically classified as non-profit organizations) account for another 9% per year of our research budget.

Question: What percentage of the university research funds obligated in FY 86 will continue existing contract awards; and will initiate new research contracts?

Answer: NSF research support is provided largely through grants rather than contracts. In FY 1986 about 70 percent of the obligations for research at universities will continue existing awards in the form of an incremental funding of an award, a renewal of an on-going research project, or a supplement to an award. The balance of the obligations, 30 percent, will be awards to initiate new research projects.

Question: Of the new university contract awards in FY 86, what percentage will be awarded through competitive procurement; merit review; and/or sole source contracting?

Answer: All new 1986 research awards made to universities will be peer reviewed.

Question: Please describe the merit review process used by NSF for reviewing university research proposals, for example; is there a single, permanent review board, or is a separate board selected to review each new solicitation?

Answer: There is not a single, permanent review board for university research proposals. The Foundation uses several methods of peer review for proposals, most of which are not in response to a specific solicitation but are unsolicited.

The most common form of review for proposals is that of ad hoc mail review. Here proposals are sent to a number of prospective reviewers chosen by the program officer. Typically a proposal would be sent to 8-10 persons and 5-6 of these would actually complete a review. The NSF program officer would then analyze the results of these reviews and make a funding recommendation based on this analysis and other pertinent factors.

Some programs, particularly those in the Biological, Behavioral, and Social Science Directorate use advisory panels in addition to ad hoc mail review. Standing panels of typically 8-15 members review a whole set of proposals, including the mail reviews of these proposals, and prepare a comprehensive set of recommendations to the Foundation for this set of proposals.

In some special programs, such as the Presidential Young Investigators program, the Visiting Professorships for Women program, and some instrumentation programs, the review is done by ad hoc panels. These panels are assembled for this one review set, they are not standing panels.

Finally, in conjunction with any of the above modes of review, the Foundation may assemble a site review team for very complex proposals. Members of such teams would typically include one or two of the earlier reviewers, some new external reviewers, and one or two NSF staff persons.

Information about these review mechanisms is distributed to the research community in general Foundation publications such as the annual Guide to Programs and the NSF Bulletin and, of course, in specific program announcements and solicitations.

Question: How many merit review boards are formed in a given fiscal year and how many members serve on those boards?

Answer: This varies from year-to-year in response to specific Foundation needs.

Question: How are those members selected and do they represent government, industry, or educational institutions?

Answer: The members of review panels are typically chosen by the program officer or division director of the discipline or disciplines involved. Nominations for reviewers are received from professional societies, NSF staff, universities, advisory committees, and self-nominees. We attempt to include persons from a wide range of affiliations on these panels. Representatives from other government entities, industry, large universities, small colleges, minority and women's colleges, and all geographic areas of the country are found on our panels.

Question: Has the merit review process, or the boards, ever been audited, reviewed or investigated by NSF or any other similar independent assessment agency?

Answer: Yes, there have been several studies over the years of the NSF merit review process. Of particular note are:

1. "Perceptions of the National Science Foundation Peer Process: A Report on a Survey of NSF Reviewers and

Applicants" by Deborah R. Hensler, December 1976.

This report was prepared for the Committee on Peer Review of the National Science Board and the Committee on Science and Technology of the U.S. House of Representatives. The study was commissioned to gather information from the scientific community itself about the peer review process.

2. "Peer Review in the National Science Foundation", (Phase I-1978 and Phase II-1981) by Stephen Cole, Jonathan R. Cole, and Leonard Rubin (Phase I only).

The study was conducted under the auspices of the Committee on Science and Public Policy of the National Academy of Sciences and funded by the NSF. The study describes proposal funding in 10 NSF programs in 1975, discusses the role of the program officer in the decision-making process, contains a statistical analysis of applicant characteristics and correlates those characteristics with awardees, and the feasibility and practicality of a "blind" review system.

3. Annual "Fairness of the NSF Award Decision Process", conducted by the NSF Evaluation Staff.

This series of studies has been conducted for the past five years. It uses a random sample of awards and declinations for a given fiscal year to study the effects of the NSF review/decision process on such groups as young investigators, women, smaller institutions, geographic region, etc.

4. Advisory Committee on Merit Review. This committee was established in April 1985 to operate for one year to evaluate merit review as practices by NSF and other agencies and provide its advice and recommendations concerning alternative systems of merit review and selection of projects for grants. It is chaired by Dr. Norman Hackerman, former Chairman of the National Science Board and has eleven members, all external to the Foundation except for one, the Assistant Director for Engineering, NSF.

Question: Please list the universities which received NSF contract awards in FY81 - FY85, their funding levels, and percentage compared to the total dollars issued to universities in that fiscal year.

Answer: Attached are tables for the period FY 1980 - FY 1984 listing in ranked order the universities receiving NSF awards, total NSF support, total Federal R&D support, and the percentage that NSF support represents of total Federal R&D support. Data for FY 1985 is being collected as part of the Federal Funds survey and will be available in summer, 1986.

Question: It has come to our attention that NSF has requested additional information from university applicants regarding "an updated list of Congressionally mandated set-aside funds" and "proposals submitted or arranged outside the proposal process." What prompted NSF to request this additional information from applicants? What office in NSF authorized this request for additional information? Was the information requested from all university applicants? What relevance does the additional information have to the NSF selection/award process?

Answer: These questions all concern the inappropriate and overzealous administrative action of a relatively new program officer within the Directorate for Engineering. The request for this additional information was made for only one proposal. The program officer, after reviewing the administrative documentation that accompanied the proposal, was concerned that one of the principal investigators connected with this proposal might be about to receive an amount of salary support that could have overcommitted the individual's time beyond twelve months per year. This particular clarification is important since NSF must be sure that the amount of research and salary support provided to an individual does not exceed his ability to be productive on all the programs to which he or she is committed.

Unfortunately, the choice of words used by the program officer to request this clarifying information was inappropriate. The result was unintended confusion regarding the need for this additional information. The Foundation's Director has discussed this particular incident with the program officer and his supervisor; he has also discussed the situation with his senior staff and has instructed them to take appropriate action in ensure this regrettable incident does not happen again. A letter of apology to the President of the applicable research institution was sent on March 31, 1986.

QUESTIONS SUBMITTED BY SENATOR LAUTENBERG

I understand that progress is being made by the group of officials from the Department of Defense, the State Department, and NSF working on a policy regarding access to supercomputers by certain foreign nationals at the NSF sponsored university supercomputer centers. I know that the universities are concerned that they not be asked to play a policing role in unclassified research facilities. It is also important that a mechanism for waivers and exceptions be part of any access policy so that, for example, classroom demonstrations of supercomputers could be allowed.

Question: Because of these concerns, I would like a description of the status of the access policy statement, including an indication of how waivers and exceptions will be handled.

Answer: The National Science Foundation, the Department of Defense, the Department of State, and other interested Federal agencies have been working to develop a national policy on access to U.S.supercomputers by Soviet Bloc nationals which will be both effective and realistic in protecting legitimate national security concerns, but not unduly compromise the traditional openness and free inquiry of our nation's campuses.

The policy which is being developed would apply to all U.S.-based supercomputers, not just those being funded by NSF. There appears to be general agreement among the agencies that the use of visa controls to carry out the policy is the best of a limited number of alternatives. Visas issued to Soviet-bloc scientists or engineers would be conditioned upon their not seeking access to or otherwise using a supercomputer while in the United States. This approach would place the onus of enforcement properly upon the United States Government; universities and other private organizations would have no legal responsibilities in this respect and would not be expected to be policemen.

The Foundation, together with a number of other interested agencies, supports a regime which is both administratively and legally feasible and which, we believe, strikes that balance between safeguarding the national security and preserving the traditional openness of scientific communications. Generally,the regime would:

1. Bar nonresident aliens from Soviet-bloc countries from access to U.S.-based supercomputers.

2. Enforce the bar by visa controls, as described above.

3. Construe the bar to allow exchange students access to supercomputers for course work asked of all students in a regular university course.

4. Allow for case-by-case determinations to permit access for scientific research in fields with no direct defense or intelligence application for Soviet-bloc researchers not known to be actively engaged in intelligence collection.

5. Include on an informal basis Guidelines for Supercomputer Center Security that codify good supercomputer security practices accepted by NSF-funded supercomputer centers.

The Department of Defense does not agree with points 3 and 4. They argue for a strict no-access regime.

Discussions continue as we search for a policy satisfactory to all interested Federal agencies and the scientific and engineering communities.

Question: Some of the universities in New Jersey have expressed concerns to me about the quality and age of their research facilities and equipment, and the lack of federal support for them. Do you see this as an important problem, and if so, how is NSF addressing it?

Answer: NSF views the state of university research facilities as a grave concern for the nation. It is clear that there are very serious deficiencies in our research laboratories, and equally clear that the first class research required to compete in the world today requires first class facilities. These facilities have been neglected for the last 20 years, and there is consequently a large inventory of unmet need.

NSF provides limited support for facilities construction. The Foundation invests in major equipment needed for research in such areas as high energy physics, supercomputing, astronomy, and oceanography. However, owing to budget constraints, NSF is unable to support the construction of general purpose laboratory facilities. The Foundation recently announced that it would consider requests for facilities construction in connection with research proposals when the facilities are unique and essential to the purpose of the research.

Question: Does NSF have, or know about, an inventory of university research facilities and their condition? What kind of information and analysis is available on the status of such facilities?

Answer: At the present time, there is no systematic inventory of university research facilities and their condition. A number of rough estimates of the magnitude of the shortfall have been made, but none based on careful survey or sampling.

In the National Science Foundation's FY 1985 authorization bill (P.L. 99-159), Congress included the following requirement concerning academic R&D facilities:

NSF is to design, establish, and maintain a data collection and analysis capability for the purpose of identifying and assessing the research facilities needs of universities. The necessary surveys are to be conducted every 2 years and the results reported to Congress. The first report is due by September 1, 1986.

P.L. 99-159 was passed by the House of Representatives on

October 24, confirmed by the Senate on November 1, and became effective on November 22, 1985. A survey to obtain the information required for the first report to Congress will be taken early this Spring.

Question: What is the effect on the ability of researchers to carry our their work of the status of their facilities. Do facilities affect researchers ability to compete with other researchers for grants and other support?

Answer: We do not have any systematic, direct information on the impact of facilities shortcomings per se on the ability of researchers to carry out their work. However, in a related area, that of instrumentation, a recent survey found that high percentages of department and research facility heads reported that there were important subject areas in which critical experiments could not be performed because of a lack of needed equipment. Lack of up-to-date physical facilities would probably not affect quite such a high percentage of critical experiments as would instrumentation, but it would undoubtedly affect some.

We do not believe that the lack of physical facilities has an important impact on the ability of researchers to compete with others researchers for grants and other support. The peer review system judges proposals primarily on the basis of scientific merit. Occasionally, it is important that a proposer demonstrate that the research is feasible, in which case the physical facilities in which it is to be conducted may become significant. However, these cases are thought to be unusual; NSF's policy regarding the support of facilities in intended to meet such needs.

Question: How would you compare the status of research facilities in this country with those of other countries? Do you see any effect on the ability of this country to be competitive in research and development with other countries?

Answer: As noted earlier, excellent research requires excellent facilities. To the extent that the United States falls behind other countries in the provision of these facilities, our ability to compete scientifically (and, ultimately, economically) will be adversely affected.

We do not have any systematic comparisons of the state of our research facilities with those of other countries. Generally speaking, there is no evidence that the United States has fallen significantly behind. However, other nations have increased their financial support of civilian research and development relative to ours in the last decade, and it appears likely that any gap that might have existed previously has been narrowed. In some fields, facilities overseas may now be superior to those in this country.

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 58
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
1	1317	UNIV OF CAL SAN DIEGO	35,463	91,427	38.8
2	2178	MASS INST OF TECHNOLOGY	25,753	142,094	18.1
3	8779	CORNELL UNIVERSITY	25,338	75,166	33.7
4	1305	STANFORD UNIVERSITY	22,343	104,610	21.4
5	1775	UNIV OF ILL URBANA	17,076	50,800	33.6
6	1312	UNIV OF CAL BERKELEY	15,568	50,426	30.9
7	2707	COLUMBIA UNIV MAIN DIV	15,369	81,511	18.9
8	3895	UNIV OF WIS-MADISON	14,601	80,828	18.1
9	3798	UNIVERSITY OF WASHINGTON	13,941	100,577	13.9
10	2230	WOODS HOLE OCNGRPHIC INST	13,377	23,427	57.1
11	1131	CALIFORNIA INST OF TECH	12,513	35,552	35.2
12	9091	UNIVERSITY OF MICHIGAN	11,669	71,935	16.2
13	2155	HARVARD UNIVERSITY	11,015	84,554	13.0
14	1315	UNIV OF CAL LOS ANGELES	10,380	87,284	11.9
15	8761	UNIVERSITY OF MINNESOTA	9,708	76,068	12.8
16	1774	UNIVERSITY OF CHICAGO	9,637	50,592	19.0
17	3378	UNIV OF PENNSYLVANIA	9,347	71,084	13.1
18	8732	PURDUE UNIVERSITY	9,173	36,724	25.0
19	8731	INDIANA UNIVERSITY	8,013	26,770	29.9
20	1426	YALE UNIVERSITY	7,974	68,937	11.6
21	3210	OREGON STATE UNIVERSITY	7,889	29,690	26.6
22	2103	UNIV OF MD COLLEGE PARK	7,396	26,463	27.9
23	3658	UNIV OF TEXAS AT AUSTIN	7,330	40,434	18.1
24	1739	NORTHWESTERN UNIVERSITY	7,289	31,982	22.8
25	2627	PRINCETON UNIVERSITY	6,771	21,492	31.5
26	2290	MICHIGAN STATE UNIVERSITY	6,405	28,836	22.2
27	1083	UNIVERSITY OF ARIZONA	6,252	33,887	18.4
28	2221	UNIV OF MASS AT AMHERST	6,148	14,415	42.7
29	3401	BROWN UNIVERSITY	6,112	15,680	39.0
30	9555	SUNY AT STONY BROOK	6,073	18,449	32.9
31	3242	CARNEGIE-MELLON UNIV	5,636	22,081	25.5
32	8717	UNIVERSITY OF COLORADO	5,564	44,823	12.4
33	3632	TEXAS A & M UNIVERSITY	5,304	26,979	19.7
34	8802	OHIO STATE UNIVERSITY	5,182	37,312	13.9
35	1328	UNIV OF SOUTHERN CAL	4,984	48,343	10.3
36	1610	UNIV OF HAWAII-MANOA	4,899	23,697	20.7
37	29094	UNIV OF ALASKA FAIRBANKS	4,894	17,908	27.3
38	8813	PENNSYLVANIA STATE UNIV	4,885	48,463	10.1
39	1536	UNIVERSITY OF MIAMI	4,725	27,986	16.9
40	1320	UNIV OF CAL SANTA BARBARA	4,686	10,946	42.8
41	2785	NEW YORK UNIVERSITY	4,629	39,494	11.7
42	8771	RUTGERS THE ST UNIV OF NJ	4,524	16,316	27.7
43	1350	COLORADO STATE UNIVERSITY	4,499	22,762	19.8
44	3675	UNIVERSITY OF UTAH	4,390	31,966	13.7
45	2894	UNIVERSITY OF ROCHESTER	4,183	41,324	10.1
46	2077	JOHNS HOPKINS UNIVERSITY	4,146	240,096	1.7
47	1313	UNIV OF CAL DAVIS	4,079	42,245	9.7
48	1535	UNIVERSITY OF FLORIDA	4,078	25,467	16.0
49	3414	UNIV OF RHODE ISLAND	4,028	12,970	31.1
50	8815	UNIVERSITY OF PITTSBURGH	3,810	33,246	11.5
51	1598	UNIVERSITY OF GEORGIA	3,808	17,056	22.3
52	2974	UNIV OF NC AT CHAPEL HILL	3,749	35,795	10.5
53	2920	DUKE UNIVERSITY	3,667	42,685	8.6

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 51
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
54	3024	CASE WESTERN RESERVE UNIV	3,635	31,420	11.6
55	3745	UNIVERSITY OF VIRGINIA	3,595	23,583	15.2
56	9554	SUNY AT BUFFALO	3,473	18,477	18.8
57	1314	UNIV OF CAL IRVINE	3,466	18,605	18.6
58	3754	VA POLYTECH INST & ST U	3,012	16,823	17.9
59	3223	UNIVERSITY OF OREGON MAIN	2,936	9,399	31.2
60	8819	UNIV OF SOUTH CAROLINA	2,842	7,877	36.1
61	2520	WASHINGTON UNIVERSITY	2,820	52,529	5.4
62	1081	ARIZONA STATE UNIVERSITY	2,745	7,380	37.2
63	3604	RICE UNIVERSITY	2,739	7,126	38.4
64	1316	UNIV OF CAL RIVERSIDE	2,724	8,640	31.5
65	1776	UNIV OF ILL CHICAGO	2,609	19,519	13.4
66	2972	N C STATE UNIV AT RALEIGH	2,599	22,378	11.6
67	2803	RENSSELAER POLYTECH INST	2,524	8,946	28.2
68	8789	SYRACUSE UNIVERSITY	2,508	10,287	24.4
69	1489	FLORIDA STATE UNIVERSITY	2,406	8,655	27.8
70	1431	UNIVERSITY OF DELAWARE	2,394	8,515	28.1
71	1892	UNIVERSITY OF IOWA	2,310	34,677	6.7
72	2565	UNIV OF NEBRASKA-LINCOLN	2,302	8,655	26.6
73	8723	GEORGIA INSTITUTE OF TECH	2,252	27,868	8.1
74	2807	ROCKEFELLER UNIVERSITY	2,227	19,686	11.3
75	1321	UNIV OF CAL SANTA CRUZ	2,128	4,560	46.7
76	2835	SUNY AT ALBANY	2,118	8,788	24.1
77	2329	WAYNE STATE UNIVERSITY	2,048	11,926	17.2
78	8718	UNIVERSITY OF CONNECTICUT	1,995	19,171	10.4
79	1840	UNIVERSITY OF NOTRE DAME	1,962	7,250	27.1
80	3800	WASHINGTON STATE UNIV	1,941	13,162	14.7
81	2053	UNIV OF MAINE ORONO	1,833	4,315	42.5
82	1928	KANS ST U - AG & APP SCI	1,772	8,156	21.7
83	1869	IOWA ST U OF SCI & TECH	1,762	10,077	17.5
84	3289	LEHIGH UNIVERSITY	1,760	5,294	33.2
85	2133	BRANDEIS UNIVERSITY	1,736	9,347	18.6
86	2130	BOSTON UNIVERSITY	1,716	24,943	6.9
87	2516	UNIV OF MISSOURI COLUMBIA	1,696	16,467	10.3
88	3535	VANDERBILT UNIVERSITY	1,655	25,978	6.4
89	29001	UNIVERSITY OF KANSAS	1,591	21,803	7.3
90	1319	UNIV OF CAL SAN FRANCISCO	1,580	62,771	2.5
91	3652	U OF HOUSTON UNIV PARK	1,522	4,950	30.7
92	8805	UNIVERSITY OF CINCINNATI	1,512	19,486	7.8
93	3896	UNIV OF WIS-MILWAUKEE	1,493	3,006	49.7
94	2573	DARTMOUTH COLLEGE	1,388	9,941	14.0
95	2199	NORTHEASTERN UNIVERSITY	1,387	4,710	29.4
96	3530	U TENNESSEE KNOXVILLE	1,371	20,710	6.6
97	2688	CUNY CITY COLLEGE	1,329	4,246	31.3
98	2589	UNIV OF NEW HAMPSHIRE	1,312	6,808	19.3
99	8745	LOUISIANA STATE UNIV	1,301	19,214	6.8
100	2663	UNIVERSITY OF NEW MEXICO	1,243	17,952	6.9
101	3932	UNIVERSITY OF WYOMING	1,209	5,623	21.5
102	1371	UNIVERSITY OF DENVER	1,197	7,390	16.2
103	8806	OKLAHOMA STATE UNIVERSITY	1,161	8,477	13.7
104	1155	SAN JOSE STATE UNIVERSITY	1,120	2,837	39.5
105	3677	UTAH STATE UNIVERSITY	1,092	9,807	11.1
106	3827	WEST VIRGINIA UNIVERSITY	1,084	8,429	12.9

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS　　12:38 FRIDAY, MARCH 14, 1986　　52
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
107	8807	UNIVERSITY OF OKLAHOMA	1,077	11,938	9.0
108	8744	UNIVERSITY OF KENTUCKY	1,073	13,982	7.7
109	3371	TEMPLE UNIVERSITY	1,039	15,368	6.8
110	2903	YESHIVA UNIVERSITY	969	40,275	2.4
111	2517	UNIV OF MISSOURI ROLLA	966	1,719	56.2
112	8799	KENT STATE UNIVERSITY	948	1,822	52.0
113	2836	SUNY AT BINGHAMTON	910	2,279	39.9
114	3644	TEXAS TECH UNIVERSITY	888	6,221	14.3
115	1444	GEORGE WASHINGTON UNIV	856	13,608	6.3
116	2292	MICHIGAN TECH UNIVERSITY	837	2,957	28.3
117	2699	CLARKSON COLLEGE OF TECH	815	2,359	34.5
118	1691	ILLINOIS INST OF TECH	808	3,802	21.3
119	3256	DREXEL UNIVERSITY	795	3,112	25.5
120	1151	SAN DIEGO STATE UNIV	768	2,008	38.2
121	1737	NORTHERN ILLINOIS UNIV	763	1,550	49.2
122	9741	UNIV OF TEXAS AT DALLAS	759	4,288	17.7
123	2796	POLYTECHNIC INST OF N Y	729	4,473	16.3
124	8766	ST LOUIS UNIVERSITY	647	6,938	9.3
125	1445	GEORGETOWN UNIVERSITY	609	13,579	4.5
126	8773	NEW MEXICO STATE UNIV	598	12,284	4.9
127	8803	OHIO UNIVERSITY	598	1,470	40.7
128	2690	CUNY QUEENS COLLEGE	596	1,148	51.9
129	2233	WORCESTER POLY INSTITUTE	589	1,282	45.9
130	2532	MONTANA STATE UNIVERSITY	581	4,617	12.6
131	1052	UNIV ALABAMA BIRMINGHAM	571	26,995	2.1
132	2687	CUNY BROOKLYN COLLEGE	556	1,365	40.7
133	1537	UNIV OF SOUTH FLORIDA	507	2,938	17.3
134	2104	UNIV OF MD BALT PROF SCH	506	17,186	2.9
135	1437	CATHOLIC UNIV OF AMERICA	490	2,392	20.5
136	2029	TULANE UNIVERSITY	481	9,061	5.3
137	2689	CUNY HUNTER COLLEGE	481	2,003	24.0
138	7026	CUNY MT SINAI SCH OF MED	472	21,799	2.2
139	8828	COLLEGE OF WILLIAM & MARY	444	1,404	31.6
140	2219	TUFTS UNIVERSITY	443	9,853	4.5
141	3696	UNIV OF VT & ST AGRIC COL	438	12,035	3.6
142	11618	U TEX HLTH SCI CTR HOUSTN	433	11,282	3.8
143	1710	LOYOLA UNIV - CHICAGO	424	2,678	15.8
144	8764	UNIVERSITY OF MISSISSIPPI	421	5,934	7.1
145	2568	UNIV OF NEVADA - RENO	419	4,101	10.2
146	3728	OLD DOMINION UNIVERSITY	416	2,803	14.8
147	1509	NOVA UNIVERSITY	411	659	62.4
148	1999	UNIVERSITY OF LOUISVILLE	405	3,677	11.0
149	1108	UNIV OF ARK FAYETTEVILLE	397	5,342	7.4
150	1574	GEORGIA STATE UNIVERSITY	395	774	51.0
151	1448	HOWARD UNIVERSITY	394	7,194	5.5
152	2654	N MEX INST MINING & TECH	389	3,175	12.3
153	2839	SUNY DOWNSTATE MED CTR	385	7,629	5.0
154	8856	OREGON GRADUATE CENTER	383	1,765	21.7
155	8800	MIAMI UNIVERSITY (OHIO)	375	1,058	35.4
156	1434	AMERICAN UNIVERSITY	370	1,039	35.6
157	2128	BOSTON COLLEGE	370	4,727	7.8
158	2621	N J INST OF TECHNOLOGY	358	828	43.2
159	3370	SWARTHMORE COLLEGE	358	393	91.1

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
160	1626	UNIVERSITY OF IDAHO	355	4,507	7.9
161	3735	VIRGINIA COMMONWLTH UNIV	349	15,685	2.2
162	3863	MARQUETTE UNIVERSITY	334	1,023	32.6
163	3425	CLEMSON UNIVERSITY	320	5,508	5.8
164	3613	SOUTHERN METHODIST UNIV	319	1,523	20.9
165	1424	WESLEYAN UNIVERSITY	304	1,576	19.3
166	2978	WAKE FOREST UNIVERSITY	300	8,069	3.7
167	1101	UNIV OF ARK LITTLE ROCK	292	629	46.4
168	2139	CLARK UNIVERSITY	290	687	42.2
169	2210	SOUTHEASTERN MASS UNIV	287	424	67.7
170	4952	U TEX MED BRNCH GALVESTON	283	11,904	2.4
171	12310	UNIVERSITY OF AKRON	283	648	43.7
172	2519	UNIV OF MISSOURI ST LOUIS	279	655	42.6
173	2105	U OF MD BALTIMORE COUNTY	273	1,507	18.1
174	2851	SUNY COL OF ENV SCI & FOR	270	675	40.0
175	1154	SAN FRANCISCO STATE UNIV	269	863	31.2
176	2639	STEVENS INSTITUTE OF TECH	267	2,236	11.9
177	7108	UNIV OF P R-RIO PIEDRAS	264	3,285	8.0
178	1564	EMORY UNIVERSITY	259	16,028	1.6
179	12305	BRIGHAM YOUNG UNIVERSITY	259	1,912	13.5
180	1326	UNIVERSITY OF SANTA CLARA	252	597	42.2
181	3470	S DAK SCH MINES & TECH	249	927	26.9
182	2229	WILLIAMS COLLEGE	247	550	44.9
183	3657	U TEXAS SYSTEM CANCER CTR	247	20,345	1.2
184	2224	WELLESLEY COLLEGE	241	382	63.1
185	4882	OREGON HLTH SCIENCES UNIV	241	8,696	2.8
186	1051	THE UNIVERSITY OF ALABAMA	237	1,604	14.8
187	1249	OCCIDENTAL COLLEGE	237	237	100.0
188	2887	ALBANY MEDICAL COLLEGE	230	5,455	4.2
189	3894	UNIV OF WISCONSIN SYS OFF	227	4,618	4.9
190	3438	MED UNIV OF SO CAROLINA	223	6,676	3.3
191	4949	BAYLOR COL OF MEDICINE	218	31,784	0.7
192	8907	DESERT RESEARCH INSTITUTE	214	488	43.9
193	3660	U TEX HLTH SCI CTR DALLAS	202	22,172	0.9
194	3636	TEXAS CHRISTIAN UNIV	200	1,289	15.5
195	6895	U OF NEB MED CTR AT OMAHA	198	4,710	4.2
196	9756	U MASS MED SCHL WORCESTER	197	5,083	3.9
197	2542	CREIGHTON UNIVERSITY	196	1,254	15.6
198	1322	UNIVERSITY OF REDLANDS	194	230	84.3
199	1758	SOUTHERN ILL U-CARBONDALE	185	2,961	6.2
200	2732	HOFSTRA UNIVERSITY	182	225	80.9
201	3086	OBERLIN COLLEGE	182	196	92.9
202	2620	UNIV OF MED & DENT OF N J	180	8,970	2.0
203	9266	NORTH DAKOTA STATE UNIV	177	3,396	5.2
204	3235	BEAVER COLLEGE	174	174	100.0
205	6725	UNIV TENN CTR HEALTH SCI	171	6,507	2.6
206	2222	UNIV OF MASS BOSTON	170	483	35.2
207	1036	SAMFORD UNIVERSITY	168	168	100.0
208	29109	FRANKLIN PIERCE LAW CTR	163	837	19.5
209	1137	CALIF ST UNIV FULLERTON	161	660	24.4
210	2307	OAKLAND UNIVERSITY	159	1,552	10.2
211	2536	UNIVERSITY OF MONTANA	155	1,673	9.3
212	3802	WESTERN WASHINGTON UNIV	153	277	55.2

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
213	3979	COLUMBIA U TEACHERS COL	151	1,541	9.8
214	8695	AUBURN UNIVERSITY	151	6,315	2.4
215	2161	UNIVERSITY OF LOWELL	148	597	24.8
216	3237	BRYN MAWR COLLEGE	147	316	46.5
217	1481	FLORIDA ATLANTIC UNIV	143	201	71.1
218	4063	CUNY GRAD SCH & UNIV CTR	142	705	20.1
219	3290	LINCOLN UNIVERSITY (PA)	140	140	100.0
220	3274	HAVERFORD COLLEGE	138	316	43.7
221	3954	UNIV OF CENTRAL FLORIDA	137	1,144	12.0
222	8796	BOWLING GREEN STATE UNIV	132	1,037	12.7
223	2115	AMHERST COLLEGE	129	803	16.1
224	3185	UNIVERSITY OF TULSA	126	233	54.1
225	2423	MISSISSIPPI STATE UNIV	124	6,102	2.0
226	8296	MEDICAL COLLEGE OF WIS	123	9,105	1.4
227	3434	FURMAN UNIVERSITY	122	125	97.6
228	3659	U TEX HLTH SCI CTR S ANTO	119	11,153	1.1
229	1169	CLAREMONT GRADUATE SCHOOL	117	133	88.0
230	2666	ADELPHI UNIVERSITY	115	513	22.4
231	1055	UNIV ALABAMA HUNTSVILLE	113	2,272	5.0
232	2273	HOPE COLLEGE	113	249	45.4
233	1171	HARVEY MUDD COLLEGE	111	173	64.2
234	2686	CUNY CENTRAL SYS OFF	111	122	91.0
235	2975	UNIV OF N C AT CHARLOTTE	111	332	33.4
236	2848	SUNY COLLEGE OSWEGO	106	132	80.3
237	9333	SANGAMON STATE UNIVERSITY	105	105	100.0
238	1692	ILLINOIS STATE UNIVERSITY	102	396	25.8
239	3217	REED COLLEGE	101	416	24.3
240	3278	THOMAS JEFFERSON UNIV	101	5,986	1.7
241	3216	PORTLAND STATE UNIVERSITY	97	1,167	8.3
242	1460	TRINITY COLLEGE	96	96	100.0
243	2840	SUNY UPSTATE MEDICAL CTR	95	4,485	2.1
244	3131	UNIVERSITY OF TOLEDO	93	499	18.6
245	3258	DUQUESNE UNIVERSITY	92	308	29.9
246	3615	SOUTHWEST TEXAS ST UNIV	91	123	74.0
247	3661	UNIV OF TEXAS AT EL PASO	90	353	25.5
248	10115	U OF TEXAS AT SAN ANTONIO	90	1,440	6.3
249	3458	AUGUSTANA COLLEGE	88	96	91.7
250	2358	MACALESTER COLLEGE	87	87	100.0
251	3487	EAST TENNESSEE STATE UNIV	85	279	30.5
252	2889	UNION COLLEGE (NY)	84	201	41.8
253	2192	MOUNT HOLYOKE COLLEGE	81	323	25.1
254	8794	UNIVERSITY OF N DAKOTA	79	5,975	1.3
255	1786	BALL STATE UNIVERSITY	78	93	83.9
256	1793	EARLHAM COLLEGE	78	78	100.0
257	2330	WESTERN MICHIGAN UNIV	77	156	49.4
258	1348	COLORADO SCHOOL OF MINES	76	2,654	2.9
259	3145	YOUNGSTOWN ST UNIVERSITY	76	133	57.1
260	9635	FLORIDA INTERNATIONAL U	75	238	31.5
261	3656	UNIV OF TEX AT ARLINGTON	73	789	9.3
262	3771	CENTRAL WASHINGTON UNIV	73	83	88.0
263	2036	BATES COLLEGE	72	72	100.0
264	1109	U OF ARKANSAS MED SCI CAM	71	1,744	4.1
265	3459	BLACK HILLS STATE COLLEGE	71	71	100.0

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 55
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
266	2031	UNIV OF SOUTHWESTERN LA	70	225	31.1
267	2834	SUNY SYSTEM OFFICE	70	1,236	5.7
268	1082	NORTHERN ARIZONA UNIV	69	357	19.3
269	4766	CUNY BERNARD BARUCH COL	69	69	100.0
270	2739	ITHACA COLLEGE	68	105	64.8
271	3599	PAN AMERICAN UNIVERSITY	68	381	17.8
272	2382	ST OLAF COLLEGE	67	127	52.8
273	1807	INDIANA STATE UNIVERSITY	65	134	48.5
274	2905	NC AG & TECH STATE UNIV	65	2,157	3.0
275	1140	CALIF ST UNIV LOS ANGELES	62	814	7.6
276	1671	DE PAUL UNIVERSITY	62	204	30.4
277	2701	COLGATE UNIVERSITY	60	60	100.0
278	9630	UNIV OF WIS-OSHKOSH	60	158	38.0
279	1612	U OF HAWA-HONOLULU COM C	58	58	100.0
280	1976	MOREHEAD STATE UNIVERSITY	57	57	100.0
281	2015	UNIVERSITY OF NEW ORLEANS	57	766	7.4
282	3032	CLEVELAND STATE UNIV	57	437	13.0
283	2441	UNIV OF STHRN MISSISSIPPI	56	678	8.3
284	2923	EAST CAROLINA UNIVERSITY	55	718	7.7
285	3571	HARDIN-SIMMONS UNIVERSITY	55	109	50.5
286	3691	MIDDLEBURY COLLEGE	54	145	37.2
287	3945	UNIV OF P R-MED SCI CMPUS	54	2,500	2.2
288	2784	NEW YORK MEDICAL COLLEGE	53	5,463	1.0
289	7022	CUNY LEHMAN COLLEGE	53	261	20.3
290	2976	UNIV OF N C AT GREENSBORO	52	191	27.2
291	3749	GEORGE MASON UNIVERSITY	52	86	60.5
292	2153	GORDON COLLEGE	51	51	100.0
293	3680	WEBER STATE COLLEGE	51	92	55.4
294	2981	WESTERN CAROLINA UNIV	50	205	24.4
295	3529	U TENNESSEE CHATTANOOGA	50	114	43.9
296	3788	SEATTLE PACIFIC UNIV	50	50	100.0
297	9800	RUSH UNIVERSITY	50	6,061	0.8
298	1139	CALIF ST UNIV LONG BEACH	48	230	20.9
299	3594	NORTH TEXAS STATE UNIV	48	1,194	4.0
300	2644	UPSALA COLLEGE	44	44	100.0
301	7737	MED COL OF OHIO AT TOLEDO	43	2,869	1.5
302	8784	PACE UNIVERSITY	43	43	100.0
303	2209	SMITH COLLEGE	42	133	31.6
304	3785	PACIFIC LUTHERAN UNIV	42	102	41.2
305	1173	POMONA COLLEGE	41	410	10.0
306	1641	BRADLEY UNIVERSITY	41	41	100.0
307	2984	UNIV OF N C AT WILMINGTON	41	114	36.0
308	3955	UNIV OF WEST FLORIDA	41	376	10.9
309	1868	GRINNELL COLLEGE	40	40	100.0
310	2259	EASTERN MICHIGAN UNIV	40	61	65.6
311	2477	KIRKSVILLE COL OSTEO MED	40	236	16.9
312	2628	RIDER COLLEGE	40	40	100.0
313	11644	U OF MD UNIVERSITY COLL	40	40	100.0
314	1741	OLIVET NAZARENE COLLEGE	39	39	100.0
315	1138	CALIF ST UNIV HAYWARD	38	243	15.6
316	2038	BOWDOIN COLLEGE	38	130	29.2
317	5015	UNIV OF WIS-PARKSIDE	38	66	57.6
318	8795	ANTIOCH UNIVERSITY	37	47	78.7

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
319	2823	ST JOHN'S UNIVERSITY (NY)	36	83	43.4
320	1172	PITZER COLLEGE	35	107	32.7
321	2708	BARNARD COLLEGE	35	197	17.8
322	2002	WESTERN KENTUCKY UNIV	34	73	46.6
323	8846	THE WRIGHT INSTITUTE	34	1,526	2.2
324	3768	WASHINGTON & LEE UNIV	33	33	100.0
325	8749	ST JOHN'S COLLEGE (MD)	33	33	100.0
326	2518	UNIV OF MISSOURI KAN CITY	32	252	12.7
327	3050	JOHN CARROLL UNIVERSITY	32	190	16.8
328	2342	COLLEGE OF ST CATHERINE	31	31	100.0
329	2843	SUNY COLLEGE CORTLAND	31	31	100.0
330	1325	UNIV OF SAN FRANCISCO	30	458	6.6
331	1579	MEDICAL COL OF GEORGIA	30	6,166	0.5
332	2632	SETON HALL UNIVERSITY	30	42	71.4
333	1572	GEORGIA SOUTHERN COLLEGE	29	228	12.7
334	2668	ALFRED UNIVERSITY	29	29	100.0
335	3037	COLLEGE OF WOOSTER	29	52	55.8
336	2849	SUNY COLLEGE PLATTSBURGH	28	246	11.4
337	10238	UNIVERSITY OF ME-BANGOR	28	28	100.0
338	1146	CALIF STATE UNIV CHICO	27	127	21.3
339	1385	FAIRFIELD UNIVERSITY	27	27	100.0
340	3109	OHIO WESLEYAN UNIVERSITY	27	100	27.0
341	3279	JUNIATA COLLEGE	27	27	100.0
342	2241	CALVIN COLLEGE	26	26	100.0
343	1050	TUSKEGEE INSTITUTE	25	2,620	1.0
344	1059	LAWSON STATE CMTY COLLEGE	25	25	100.0
345	1153	CALIF ST UNIV NORTHRIDGE	25	573	4.4
346	1243	MOUNT ST MARY'S COLLEGE	25	25	100.0
347	1694	CHICAGO STATE UNIVERSITY	25	58	43.1
348	1759	S ILLINOIS U EDWARDSVILLE	25	160	15.6
349	1842	VALPARAISO UNIVERSITY	25	25	100.0
350	2143	CURRY COLLEGE	25	25	100.0
351	2183	BRIDGEWATER STATE COLLEGE	25	25	100.0
352	2501	SOUTHEAST MISSOURI ST U	25	25	100.0
353	2846	SUNY COLLEGE NEW PALTZ	25	80	31.3
354	2895	VASSAR COLLEGE	25	250	10.0
355	2918	DAVIDSON COLLEGE	25	25	100.0
356	2982	WESTERN PIEDMONT CMTY COL	25	25	100.0
357	3049	HIRAM COLLEGE	25	25	100.0
358	3262	ELIZABETHTOWN COLLEGE	25	25	100.0
359	3407	RHODE ISLAND COLLEGE	25	92	27.2
360	3432	ERSKINE COLLEGE	25	25	100.0
361	3523	TENN TECHNOLOGICAL UNIV	25	330	7.6
362	3647	TRINITY UNIVERSITY	25	398	6.3
363	8770	FAIRLEIGH DICKINSON UNIV	25	320	7.8
364	8988	LURLEEN B WALLACE ST JR C	25	25	100.0
365	9167	WRIGHT STATE UNIVERSITY	25	2,866	0.9
366	1544	ALBANY STATE COLLEGE	24	24	100.0
367	1583	MORRIS BROWN COLLEGE	24	55	43.6
368	1830	ROSE-HULMAN INST OF TECH	24	34	70.6
369	1977	MURRAY STATE UNIVERSITY	24	40	60.0
370	2301	NORTHERN MICHIGAN UNIV	24	65	36.9
371	2340	CARLETON COLLEGE	24	24	100.0

INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
372	2554	UNIV OF NEBRASKA AT OMAHA	24	88	27.3
373	2806	ROCHESTER INST TECHNOLOGY	24	118	20.3
374	2861	CAYUGA COUNTY CMTY COL	24	24	100.0
375	3471	SOUTH DAKOTA STATE UNIV	24	2,688	0.9
376	3474	UNIV OF SOUTH DAKOTA	24	630	3.8
377	3753	VIRGINIA MILITARY INST	24	82	29.3
378	7266	PIMA COMMUNITY COLLEGE	24	24	100.0
379	1057	UNIV OF SOUTH ALABAMA	23	2,085	1.1
380	1238	MILLS COLLEGE	23	64	35.9
381	1582	MOREHOUSE COLLEGE	23	233	9.9
382	1590	SAVANNAH STATE COLLEGE	23	23	100.0
383	2140	COL OF OUR LADY OF ELMS	23	23	100.0
384	2722	FORDHAM UNIVERSITY	23	1,156	2.0
385	3284	LAFAYETTE COLLEGE	23	36	63.9
386	3287	LA SALLE COLLEGE	23	23	100.0
387	10256	BENEDICTINE COLLEGE	23	23	100.0
388	1099	HENDRIX COLLEGE	22	22	100.0
389	1262	POINT LOMA COLLEGE	22	22	100.0
390	1954	BELLARMINE COLLEGE	22	22	100.0
391	3142	WILMINGTON COLLEGE	22	22	100.0
392	3150	CAMERON UNIVERSITY	22	22	100.0
393	3265	FRANKLIN & MARSHALL COL	22	53	41.5
394	8244	JOHNSON COUNTY CMTY COL	22	22	100.0
395	1329	UNIVERSITY OF THE PACIFIC	21	567	3.7
396	1467	BETHUNE COOKMAN COLLEGE	21	21	100.0
397	2597	BLOOMFIELD COLLEGE	21	21	100.0
398	2731	HOBART-WM SMITH COLLEGES	21	21	100.0
399	2906	APPALACHIAN ST UNIVERSITY	21	979	2.1
400	3238	BUCKNELL UNIVERSITY	21	146	14.4
401	3744	UNIVERSITY OF RICHMOND	21	126	16.7
402	1963	EASTERN KENTUCKY UNIV	20	48	41.7
403	2512	STEPHENS COLLEGE	20	20	100.0
404	2693	CUNY JHN JAY COL CRIM JUS	20	20	100.0
405	1024	LIVINGSTON UNIVERSITY	19	19	100.0
406	1088	ARKANSAS COLLEGE	19	19	100.0
407	1150	CALIF ST UNIV SACRAMENTO	19	539	3.5
408	1480	FLORIDA A & M UNIVERSITY	19	859	2.2
409	2625	WILLIAM PATERSON COLLEGE	19	19	100.0
410	2813	SARAH LAWRENCE COLLEGE	19	30	63.3
411	2841	SUNY COLLEGE BROCKPORT	19	41	46.3
412	3320	EAST STROUDSBURG U OF PA	19	19	100.0
413	3598	OUR LADY OF THE LAKE UNIV	19	111	17.1
414	1422	UNIVERSITY OF HARTFORD	18	64	28.1
415	1443	GALLAUDET COLLEGE	17	148	11.5
416	2032	XAVIER UNIVERSITY OF LA	17	98	17.3
417	3143	WITTENBERG UNIVERSITY	17	17	100.0
418	3925	UNIV OF WIS-SUPERIOR	17	640	2.7
419	8918	SADDLEBACK COLLEGE	17	17	100.0
420	1141	CAL ST U DOMINGUEZ HILLS	16	16	100.0
421	2760	MANHATTANVILLE COLLEGE	16	16	100.0
422	3534	UNIVERSITY OF THE SOUTH	16	16	100.0
423	3537	ABILENE CHRISTIAN UNIV	16	16	100.0
424	1856	CORNELL COLLEGE	15	58	25.9

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                                   INSTITUTIONS RANKED BY FY 1980 NSF R&D OBLIGATIONS        12:38 FRIDAY, MARCH 14, 1986   58
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OBS    FICE    INSTITUTION                   NSF R&D OBLIGATIONS     TOTAL R&D    NSF R&D OBLIGATIONS
                                                                    OBLIGATIONS   AS PERCENT OF TOTAL

425    2854    SUNY AG & TECH ALFRED                         15            15            100.0
426    3423    CITADEL MILITARY COL S C                      15            26             57.7
427    8078    SPRINGFIELD TECH CMTY COL                     15            15            100.0
428    2227    WHEATON COLLEGE                               14            27             51.9
429    2716    EISENHOWER COLLEGE                            14            14            100.0
430    3591    MCMURRY COLLEGE                               14            14            100.0
431    1620    IDAHO STATE UNIVERSITY                        13           214              6.1
432    3042    DENISON UNIVERSITY                            13            35             37.1
433    3149    BETHANY NAZARENE COLLEGE                      13            13            100.0
434    2603    DREW UNIVERSITY                               12            12            100.0
435    2850    SUNY COLLEGE POTSDAM                          12            12            100.0
436    3723    MARY BALDWIN COLLEGE                          12            12            100.0
437    1531    STETSON UNIVERSITY                            11            11            100.0
438    2622    KEAN COL OF NEW JERSEY                        11            11            100.0
439    3428    COLLEGE OF CHARLESTON                         11            11            100.0
440    1602    GEORGIA COLLEGE                               10            10            100.0
441    3253    DICKINSON COLLEGE                             10            10            100.0
442    3808    BETHANY COLLEGE (WV)                          10            10            100.0
443    7993    CALIF ST COL BAKERSFIELD                      10            10            100.0
444    2208    SIMMONS COLLEGE                                9           207              4.3
445    3721    JAMES MADISON UNIVERSITY                       9             9            100.0
446    3935    UNIVERSITY OF GUAM                             9           679              1.3
447    1844    WABASH COLLEGE                                 8             8            100.0
448    1939    KANSAS NEWMAN COLLEGE                          8             8            100.0
449    1950    WICHITA STATE UNIVERSITY                       8           241              3.3
450    2073    GOUCHER COLLEGE                                8             8            100.0
451    2354    HAMLINE UNIVERSITY                             8             8            100.0
452    8076    JOHN A LOGAN COLLEGE                           8             8            100.0
453    1147    CALIF STATE UNIV FRESNO                        7            82              8.5
454    2235    ALBION COLLEGE                                 7             7            100.0
455    3509    MEMPHIS STATE UNIVERSITY                       7           389              1.8
456    3919    UNIV OF WIS-LA CROSSE                          7             7            100.0
457    1487    ECKERD COLLEGE                                 6            81              7.4
458    1874    LUTHER COLLEGE                                 6             6            100.0
459    3268    GETTYSBURG COLLEGE                             6             6            100.0
460    3388    VILLANOVA UNIVERSITY                           6           155              3.9
461    1538    UNIVERSITY OF TAMPA                            5             5            100.0
462    3733    RANDOLPH-MACON COLLEGE                         5             5            100.0
463    1144    CALIF ST POLY UNIV POMONA                      4           102              3.9
464    2008    LOUISIANA TECH UNIVERSITY                      4           226              1.8
465    2033    UNIV MAINE, PRESQUE ISLE                       2             2            100.0
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                                                        633,803     4,159,857
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                         INSTITUTIONS RANKED BY FY 1981 NSF R&D OBLIGATIONS        12:38 FRIDAY, MARCH 14, 1986   37
                                         (THOUSANDS OF DOLLARS)

OBS    FICE    INSTITUTION                     NSF R&D OBLIGATIONS       TOTAL R&D       NSF R&D OBLIGATIONS
                                                                        OBLIGATIONS      AS PERCENT OF TOTAL

  1    1317    UNIV OF CAL SAN DIEGO                  32,905               91,403               36.0
  2    2178    MASS INST OF TECHNOLOGY                22,049              146,035               15.1
  3    8779    CORNELL UNIVERSITY                     20,741               72,671               28.5
  4    1775    UNIV OF ILL URBANA                     17,750               53,583               33.1
  5    1305    STANFORD UNIVERSITY                    17,608              106,073               16.6
  6    2707    COLUMBIA UNIV MAIN DIV                 16,947               83,659               20.3
  7    1312    UNIV OF CAL BERKELEY                   16,922               64,065               26.4
  8    3798    UNIVERSITY OF WASHINGTON               16,022               99,965               16.0
  9    2230    WOODS HOLE OCNGRPHIC INST              15,611               27,633               56.5
 10    3895    UNIV OF WIS-MADISON                    14,520               86,918               16.7
 11    9091    UNIVERSITY OF MICHIGAN                 11,436               73,999               15.5
 12    1131    CALIFORNIA INST OF TECH                11,330               32,959               34.4
 13    1315    UNIV OF CAL LOS ANGELES                10,679               94,945               11.2
 14    2155    HARVARD UNIVERSITY                     10,593               87,830               12.1
 15    3378    UNIV OF PENNSYLVANIA                    9,896               76,136               13.0
 16    1774    UNIVERSITY OF CHICAGO                   9,554               53,992               17.7
 17    8732    PURDUE UNIVERSITY                       9,039               36,549               24.7
 18    2627    PRINCETON UNIVERSITY                    8,912               23,888               37.3
 19    8761    UNIVERSITY OF MINNESOTA                 8,428               72,001               11.7
 20    8731    INDIANA UNIVERSITY                      8,237               29,276               28.1
 21    3210    OREGON STATE UNIVERSITY                 7,879               27,669               28.5
 22    1426    YALE UNIVERSITY                         7,832               73,526               10.7
 23    1739    NORTHWESTERN UNIVERSITY                 7,201               32,446               22.2
 24    2103    UNIV OF MD COLLEGE PARK                 7,048               27,313               25.8
 25    2290    MICHIGAN STATE UNIVERSITY               6,641               34,000               19.5
 26    3658    UNIV OF TEXAS AT AUSTIN                 6,610               43,756               15.1
 27    3401    BROWN UNIVERSITY                    [illegible]373          16,020               39.8
 28    3242    CARNEGIE-MELLON UNIV                    6,223               21,915               28.4
 29    2221    UNIV OF MASS AT AMHERST                 6,038               15,131               39.9
 30    8717    UNIVERSITY OF COLORADO                  5,765               46,146               12.5
 31    1320    UNIV OF CAL SANTA BARBARA               5,758               12,688               45.4
 32    8802    OHIO STATE UNIVERSITY                   5,685               42,699               13.3
 33   29094    UNIV OF ALASKA FAIRBANKS                5,664               10,679               53.0
 34    1083    UNIVERSITY OF ARIZONA                   5,481               36,308               15.1
 35    8771    RUTGERS THE ST UNIV OF NJ               5,446               18,011               30.2
 36    3414    UNIV OF RHODE ISLAND                    5,244               11,315               46.3
 37    9555    SUNY AT STONY BROOK                     5,213               19,602               26.6
 38    3632    TEXAS A & M UNIVERSITY                  5,187               34,398               15.1
 39    2077    JOHNS HOPKINS UNIVERSITY                5,047              363,429                1.4
 40    8815    UNIVERSITY OF PITTSBURGH                4,970               38,512               12.9
 41    2894    UNIVERSITY OF ROCHESTER                 4,927               42,983               11.5
 42    8813    PENNSYLVANIA STATE UNIV                 4,905               47,099               10.4
 43    1328    UNIV OF SOUTHERN CAL                    4,578               49,221                9.3
 44    1313    UNIV OF CAL DAVIS                       4,558               31,757               14.4
 45    1350    COLORADO STATE UNIVERSITY               4,513               21,487               21.0
 46    1610    UNIV OF HAWAII-MANOA                    4,451               20,629               21.6
 47    3675    UNIVERSITY OF UTAH                      4,365               38,163               11.4
 48    1536    UNIVERSITY OF MIAMI                     4,295               28,956               14.8
 49    3024    CASE WESTERN RESERVE UNIV               3,958               33,744               11.7
 50    1314    UNIV OF CAL IRVINE                      3,932               20,614               19.1
 51    2920    DUKE UNIVERSITY                         3,592               44,287                8.1
 52    1535    UNIVERSITY OF FLORIDA                   3,543               30,845               11.5
 53    2785    NEW YORK UNIVERSITY                     3,339               40,636                8.2
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INSTITUTIONS RANKED BY FY 1981 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
54	2974	UNIV OF NC AT CHAPEL HILL	3,326	38,447	8.7
55	2803	RENSSELAER POLYTECH INST	3,303	10,448	31.6
56	3745	UNIVERSITY OF VIRGINIA	3,234	24,333	13.3
57	8819	UNIV OF SOUTH CAROLINA	3,122	7,752	40.3
58	3754	VA POLYTECH INST & ST U	3,099	16,449	18.8
59	1598	UNIVERSITY OF GEORGIA	2,856	17,045	16.8
60	2565	UNIV OF NEBRASKA-LINCOLN	2,826	11,108	25.4
61	1489	FLORIDA STATE UNIVERSITY	2,791	9,463	29.5
62	3604	RICE UNIVERSITY	2,744	7,091	38.7
63	8723	GEORGIA INSTITUTE OF TECH	2,626	33,616	7.8
64	1081	ARIZONA STATE UNIVERSITY	2,608	6,236	41.8
65	8789	SYRACUSE UNIVERSITY	2,602	10,689	24.3
66	3223	UNIVERSITY OF OREGON MAIN	2,456	9,463	26.0
67	9554	SUNY AT BUFFALO	2,456	16,224	15.1
68	1431	UNIVERSITY OF DELAWARE	2,452	7,571	32.4
69	2520	WASHINGTON UNIVERSITY	2,430	54,170	4.5
70	1316	UNIV OF CAL RIVERSIDE	2,318	8,690	26.7
71	1776	UNIV OF ILL CHICAGO	2,243	21,394	10.5
72	1321	UNIV OF CAL SANTA CRUZ	2,172	4,130	52.6
73	1840	UNIVERSITY OF NOTRE DAME	2,144	12,970	16.5
74	2835	SUNY AT ALBANY	2,123	8,302	25.6
75	3800	WASHINGTON STATE UNIV	2,121	12,896	16.4
76	1892	UNIVERSITY OF IOWA	2,085	35,300	5.9
77	2133	BRANDEIS UNIVERSITY	2,028	9,168	22.1
78	8718	UNIVERSITY OF CONNECTICUT	2,015	22,196	9.1
79	3932	UNIVERSITY OF WYOMING	1,932	7,541	25.6
80	2972	N C STATE UNIV AT RALEIGH	1,916	16,758	11.4
81	3289	LEHIGH UNIVERSITY	1,861	4,883	38.1
82	2130	BOSTON UNIVERSITY	1,849	27,019	6.8
83	2329	WAYNE STATE UNIVERSITY	1,805	12,582	14.3
84	1928	KANS ST U - AG & APP SCI	1,759	8,501	20.7
85	1869	IOWA ST U OF SCI & TECH	1,685	10,396	16.2
86	3530	U TENNESSEE KNOXVILLE	1,649	19,933	8.3
87	2053	UNIV OF MAINE ORONO	1,601	4,909	32.6
88	2663	UNIVERSITY OF NEW MEXICO	1,599	18,976	8.4
89	29001	UNIVERSITY OF KANSAS	1,560	17,205	9.1
90	8805	UNIVERSITY OF CINCINNATI	1,512	18,766	8.1
91	8745	LOUISIANA STATE UNIV	1,479	19,323	7.7
92	2807	ROCKEFELLER UNIVERSITY	1,415	19,952	7.1
93	8744	UNIVERSITY OF KENTUCKY	1,340	12,875	10.4
94	1319	UNIV OF CAL SAN FRANCISCO	1,305	64,814	2.0
95	1691	ILLINOIS INST OF TECH	1,294	4,754	27.2
96	3677	UTAH STATE UNIVERSITY	1,282	15,412	8.3
97	8807	UNIVERSITY OF OKLAHOMA	1,228	9,403	13.1
98	1151	SAN DIEGO STATE UNIV	1,183	2,893	40.9
99	1371	UNIVERSITY OF DENVER	1,182	7,694	15.4
100	2573	DARTMOUTH COLLEGE	1,160	10,595	10.9
101	2589	UNIV OF NEW HAMPSHIRE	1,154	6,688	17.3
102	3535	VANDERBILT UNIVERSITY	1,126	27,426	4.1
103	3652	U OF HOUSTON UNIV PARK	1,108	5,931	18.7
104	2688	CUNY CITY COLLEGE	1,091	4,541	24.0
105	3896	UNIV OF WIS-MILWAUKEE	1,064	2,151	49.5
106	2516	UNIV OF MISSOURI COLUMBIA	1,046	14,477	7.2

INSTITUTIONS RANKED BY FY 1981 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
107	2199	NORTHEASTERN UNIVERSITY	978	4,535	21.6
108	2903	YESHIVA UNIVERSITY	957	42,590	2.2
109	9741	UNIV OF TEXAS AT DALLAS	956	4,273	22.4
110	2836	SUNY AT BINGHAMTON	806	2,186	36.9
111	2219	TUFTS UNIVERSITY	781	15,642	5.0
112	1564	EMORY UNIVERSITY	777	17,374	4.5
113	2699	CLARKSON COLLEGE OF TECH	772	2,097	36.8
114	2517	UNIV OF MISSOURI ROLLA	763	1,804	42.3
115	8907	DESERT RESEARCH INSTITUTE	752	1,189	63.2
116	1108	UNIV OF ARK FAYETTEVILLE	749	5,947	12.6
117	3371	TEMPLE UNIVERSITY	745	14,678	5.1
118	1737	NORTHERN ILLINOIS UNIV	725	1,114	65.1
119	2029	TULANE UNIVERSITY	725	8,839	8.2
120	2796	POLYTECHNIC INST OF N Y	699	3,749	18.6
121	8806	OKLAHOMA STATE UNIVERSITY	660	7,028	9.4
122	1444	GEORGE WASHINGTON UNIV	624	14,503	4.3
123	8828	COLLEGE OF WILLIAM & MARY	622	1,348	46.1
124	2233	WORCESTER POLY INSTITUTE	607	1,215	50.0
125	3613	SOUTHERN METHODIST UNIV	602	1,656	36.4
126	8773	NEW MEXICO STATE UNIV	591	11,759	5.0
127	1537	UNIV OF SOUTH FLORIDA	584	3,693	15.8
128	1052	UNIV ALABAMA BIRMINGHAM	539	29,970	1.8
129	2139	CLARK UNIVERSITY	527	1,163	45.3
130	8799	KENT STATE UNIVERSITY	522	1,188	43.9
131	1445	GEORGETOWN UNIVERSITY	503	10,327	4.9
132	3644	TEXAS TECH UNIVERSITY	490	6,968	7.0
133	1448	HOWARD UNIVERSITY	487	7,996	6.1
134	11618	U TEX HLTH SCI CTR HOUSTN	485	12,987	3.7
135	1155	SAN JOSE STATE UNIVERSITY	461	2,562	18.0
136	3425	CLEMSON UNIVERSITY	436	5,761	7.6
137	3256	DREXEL UNIVERSITY	429	3,184	13.5
138	3696	UNIV OF VT & ST AGRIC COL	425	11,950	3.6
139	2654	N MEX INST MINING & TECH	423	2,888	14.6
140	3470	S DAK SCH MINES & TECH	422	972	43.4
141	1434	AMERICAN UNIVERSITY	404	997	40.5
142	3735	VIRGINIA COMMONWLTH UNIV	391	16,713	2.3
143	1051	THE UNIVERSITY OF ALABAMA	386	1,681	23.0
144	2687	CUNY BROOKLYN COLLEGE	386	936	41.2
145	2804	HARTFORD GRADUATE CENTER	379	379	100.0
146	3438	MED UNIV OF SO CAROLINA	379	7,427	5.1
147	8764	UNIVERSITY OF MISSISSIPPI	379	6,606	5.7
148	2536	UNIVERSITY OF MONTANA	378	1,636	23.1
149	1710	LOYOLA UNIV - CHICAGO	370	2,090	17.7
150	2532	MONTANA STATE UNIVERSITY	366	4,140	8.8
151	7026	CUNY MT SINAI SCH OF MED	363	19,874	1.8
152	1437	CATHOLIC UNIV OF AMERICA	348	1,935	18.0
153	3827	WEST VIRGINIA UNIVERSITY	340	7,529	4.5
154	2161	UNIVERSITY OF LOWELL	337	1,058	31.9
155	3659	U TEX HLTH SCI CTR S ANTO	308	13,314	2.3
156	2128	BOSTON COLLEGE	302	5,222	5.8
157	4949	BAYLOR COL OF MEDICINE	298	35,062	0.8
158	2628	UNIV OF MED & DENT OF N J	291	11,115	2.6
159	2104	UNIV OF MD BALT PROF SCH	286	20,414	1.4

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(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
160	4952	U TEX MED BRNCH GALVESTON	285	10,271	2.8
161	8296	MEDICAL COLLEGE OF WIS	279	9,428	3.0
162	3660	U TEX HLTH SCI CTR DALLAS	276	23,911	1.2
163	12310	UNIVERSITY OF AKRON	276	844	32.7
164	2839	SUNY DOWNSTATE MED CTR	271	6,961	3.9
165	1424	WESLEYAN UNIVERSITY	268	1,158	23.1
166	8766	ST LOUIS UNIVERSITY	268	8,098	3.3
167	2639	STEVENS INSTITUTE OF TECH	264	2,513	10.5
168	3802	WESTERN WASHINGTON UNIV	262	318	82.4
169	8856	OREGON GRADUATE CENTER	248	1,608	15.4
170	2621	N J INST OF TECHNOLOGY	247	298	82.9
171	1626	UNIVERSITY OF IDAHO	235	5,583	4.2
172	3370	SWARTHMORE COLLEGE	232	319	72.7
173	3594	NORTH TEXAS STATE UNIV	231	1,415	16.3
174	12305	BRIGHAM YOUNG UNIVERSITY	230	1,348	17.1
175	3237	BRYN MAWR COLLEGE	227	441	51.5
176	7108	UNIV OF P R-RIO PIEDRAS	221	3,557	6.2
177	2689	CUNY HUNTER COLLEGE	220	1,934	11.4
178	1509	NOVA UNIVERSITY	217	463	46.9
179	2224	WELLESLEY COLLEGE	213	356	59.8
180	2568	UNIV OF NEVADA - RENO	213	4,276	5.0
181	3274	HAVERFORD COLLEGE	213	254	83.9
182	8803	OHIO UNIVERSITY	205	1,539	13.3
183	2840	SUNY UPSTATE MEDICAL CTR	199	4,272	4.7
184	1137	CALIF ST UNIV FULLERTON	193	496	38.9
185	3728	OLD DOMINION UNIVERSITY	192	2,647	7.3
186	1171	HARVEY MUDD COLLEGE	190	285	66.7
187	2851	SUNY COL OF ENV SCI & FOR	185	578	32.0
188	3863	MARQUETTE UNIVERSITY	182	865	21.0
189	2307	OAKLAND UNIVERSITY	181	1,821	9.9
190	3127	UNIVERSITY OF DAYTON	176	15,049	1.2
191	3216	PORTLAND STATE UNIVERSITY	176	1,066	16.5
192	3197	LEWIS & CLARK COLLEGE	171	171	100.0
193	1579	MEDICAL COL OF GEORGIA	165	5,499	3.0
194	9167	WRIGHT STATE UNIVERSITY	163	2,978	5.5
195	8794	UNIVERSITY OF N DAKOTA	160	7,182	2.2
196	3086	OBERLIN COLLEGE	155	155	100.0
197	1057	UNIV OF SOUTH ALABAMA	153	2,739	5.6
198	3945	UNIV OF P R-MED SCI CMPUS	153	2,505	6.1
199	8695	AUBURN UNIVERSITY	153	6,020	2.5
200	2015	UNIVERSITY OF NEW ORLEANS	151	524	28.8
201	1551	ATLANTA UNIVERSITY	150	991	15.1
202	1574	GEORGIA STATE UNIVERSITY	150	692	21.7
203	1481	FLORIDA ATLANTIC UNIV	149	149	100.0
204	3899	UNIV OF WIS-GREEN BAY	149	181	82.3
205	3656	UNIV OF TEX AT ARLINGTON	146	429	34.0
206	1999	UNIVERSITY OF LOUISVILLE	143	3,870	3.7
207	2292	MICHIGAN TECH UNIVERSITY	141	2,516	5.6
208	1149	HUMBOLDT STATE UNIVERSITY	140	194	72.2
209	1758	SOUTHERN ILL U-CARBONDALE	139	2,505	5.5
210	8800	MIAMI UNIVERSITY (OHIO)	136	503	27.0
211	1348	COLORADO SCHOOL OF MINES	131	1,301	10.1
212	7022	CUNY LEHMAN COLLEGE	128	217	59.0

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
213	2531	MONT COL MINRL SCI & TECH	125	166	75.3
214	2105	U OF MD BALTIMORE COUNTY	124	1,283	9.7
215	4063	CUNY GRAD SCH & UNIV CTR	124	565	21.9
216	3487	EAST TENNESSEE STATE UNIV	122	233	52.4
217	10115	U OF TEXAS AT SAN ANTONIO	121	1,126	10.7
218	3131	UNIVERSITY OF TOLEDO	120	665	18.0
219	1692	ILLINOIS STATE UNIVERSITY	118	283	41.7
220	2083	MORGAN STATE UNIVERSITY	115	306	37.6
221	3749	GEORGE MASON UNIVERSITY	115	248	46.4
222	1055	UNIV ALABAMA HUNTSVILLE	114	2,261	5.0
223	1154	SAN FRANCISCO STATE UNIV	111	505	22.0
224	2441	UNIV OF STHRN MISSISSIPPI	109	509	21.4
225	3894	UNIV OF WISCONSIN SYS OFF	107	476	22.5
226	2984	UNIV OF N C AT WILMINGTON	106	215	49.3
227	3434	FURMAN UNIVERSITY	106	113	93.8
228	3636	TEXAS CHRISTIAN UNIV	106	569	18.6
229	6725	UNIV TENN CTR HEALTH SCI	106	7,339	1.4
230	3185	UNIVERSITY OF TULSA	104	495	21.0
231	6895	U OF NEB MED CTR AT OMAHA	101	3,713	2.7
232	4882	OREGON HLTH SCIENCES UNIV	98	8,522	1.1
233	3661	UNIV OF TEXAS AT EL PASO	96	368	26.1
234	1140	CALIF ST UNIV LOS ANGELES	93	701	13.3
235	1469	FLORIDA INST OF TECH	90	541	16.6
236	9756	U MASS MED SCHL WORCESTER	88	6,529	1.3
237	2273	HOPE COLLEGE	83	194	42.8
238	1807	INDIANA STATE UNIVERSITY	82	161	50.9
239	2542	CREIGHTON UNIVERSITY	80	1,011	7.9
240	3268	GETTYSBURG COLLEGE	80	80	100.0
241	3398	THE MEDICAL COL OF PENNA	80	2,993	2.7
242	1641	BRADLEY UNIVERSITY	79	144	54.9
243	2423	MISSISSIPPI STATE UNIV	79	6,537	1.2
244	2701	COLGATE UNIVERSITY	78	78	100.0
245	2222	UNIV OF MASS BOSTON	77	758	10.2
246	2210	SOUTHEASTERN MASS UNIV	76	326	23.3
247	9266	NORTH DAKOTA STATE UNIV	76	3,113	2.4
248	2978	WAKE FOREST UNIVERSITY	73	8,528	0.9
249	3217	REED COLLEGE	73	452	16.2
250	7737	MED COL OF OHIO AT TOLEDO	73	3,272	2.2
251	8796	BOWLING GREEN STATE UNIV	73	501	14.6
252	2115	AMHERST COLLEGE	69	474	14.6
253	3979	COLUMBIA U TEACHERS COL	67	1,794	3.7
254	9630	UNIV OF WIS-OSHKOSH	67	67	100.0
255	2569	UNIV OF NEVADA LAS VEGAS	66	1,107	6.0
256	4766	CUNY BERNARD BARUCH COL	66	66	100.0
257	1325	UNIV OF SAN FRANCISCO	64	439	14.6
258	1706	LAKE FOREST COLLEGE	58	58	100.0
259	1572	GEORGIA SOUTHERN COLLEGE	57	246	23.2
260	7109	SUNY COL AT OLD WESTBURY	57	57	100.0
261	1153	CALIF ST UNIV NORTHRIDGE	56	363	15.4
262	1347	COLORADO COLLEGE	56	56	100.0
263	1414	TRINITY COLLEGE	56	169	33.1
264	1844	WABASH COLLEGE	56	56	100.0
265	2976	UNIV OF N C AT GREENSBORO	56	56	100.0

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(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
266	1150	CALIF ST UNIV SACRAMENTO	55	514	10.7
267	3265	FRANKLIN & MARSHALL COL	55	55	100.0
268	1950	WICHITA STATE UNIVERSITY	54	345	15.7
269	3732	RADFORD UNIVERSITY	54	54	100.0
270	3065	KENYON COLLEGE	53	53	100.0
271	2243	CENTRAL MICHIGAN UNIV	52	65	80.0
272	1874	LUTHER COLLEGE	50	50	100.0
273	3238	BUCKNELL UNIVERSITY	50	155	32.3
274	3271	HAHNEMANN UNIVERSITY	50	5,238	1.0
275	3529	U TENNESSEE CHATTANOOGA	50	138	36.2
276	2722	FORDHAM UNIVERSITY	49	924	5.3
277	1082	NORTHERN ARIZONA UNIV	48	289	16.6
278	2031	UNIV OF SOUTHWESTERN LA	48	339	14.2
279	3691	MIDDLEBURY COLLEGE	48	66	72.7
280	1139	CALIF ST UNIV LONG BEACH	47	390	12.1
281	3032	CLEVELAND STATE UNIV	47	880	5.3
282	2153	GORDON COLLEGE	46	46	100.0
283	2686	CUNY CENTRAL SYS OFF	46	71	64.8
284	2330	WESTERN MICHIGAN UNIV	45	140	32.1
285	3615	SOUTHWEST TEXAS ST UNIV	45	45	100.0
286	2710	COOPER UNION	43	88	48.9
287	2895	VASSAR COLLEGE	43	226	19.0
288	1620	IDAHO STATE UNIVERSITY	42	48	87.5
289	3919	UNIV OF WIS-LA CROSSE	42	42	100.0
290	2666	ADELPHI UNIVERSITY	41	241	17.0
291	2981	WESTERN CAROLINA UNIV	40	192	20.8
292	8155	EVERGREEN STATE COLLEGE	40	49	81.6
293	8841	COL OF THE VIRGIN ISLANDS	40	878	4.6
294	9930	UNIV OF TEX PERMIAN BASIN	40	40	100.0
295	3458	AUGUSTANA COLLEGE	39	43	90.7
296	1172	PITZER COLLEGE	38	104	36.5
297	2889	UNION COLLEGE (NY)	36	74	48.6
298	3278	THOMAS JEFFERSON UNIV	36	6,861	0.5
299	1694	CHICAGO STATE UNIVERSITY	35	176	19.9
300	2078	LOYOLA COLLEGE	35	35	100.0
301	3050	JOHN CARROLL UNIVERSITY	35	291	12.0
302	3715	HOLLINS COLLEGE	35	35	100.0
303	8724	MERCER UNIVERSITY	35	35	100.0
304	2503	SOUTHWEST MISSOURI ST U	34	72	47.2
305	1109	U OF ARKANSAS MED SCI CAM	33	1,524	2.2
306	2477	KIRKSVILLE COL OSTEO MED	33	354	9.3
307	2739	ITHACA COLLEGE	33	74	44.6
308	3428	COLLEGE OF CHARLESTON	33	196	16.8
309	3509	MEMPHIS STATE UNIVERSITY	33	608	5.4
310	3897	UNIV OF WIS-CENTER SYSTEM	33	43	76.7
311	1329	UNIVERSITY OF THE PACIFIC	32	698	4.6
312	1487	ECKERD COLLEGE	32	149	21.5
313	1379	CONNECTICUT COLLEGE	31	46	67.4
314	2183	BRIDGEWATER STATE COLLEGE	31	31	100.0
315	2849	SUNY COLLEGE PLATTSBURGH	31	151	20.5
316	3768	WASHINGTON & LEE UNIV	31	31	100.0
317	7993	CALIF ST COL BAKERSFIELD	31	31	100.0
318	8784	PACE UNIVERSITY	31	107	29.0

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
319	1963	EASTERN KENTUCKY UNIV	30	33	90.9
320	2784	NEW YORK MEDICAL COLLEGE	30	5,392	0.6
321	3799	WALLA WALLA COLLEGE	30	30	100.0
322	10395	UNIVERSITY OF SAN DIEGO	30	30	100.0
323	3284	LAFAYETTE COLLEGE	29	42	69.0
324	3721	JAMES MADISON UNIVERSITY	29	29	100.0
325	2748	LE MOYNE COLLEGE	28	28	100.0
326	2923	EAST CAROLINA UNIVERSITY	28	752	3.7
327	8770	FAIRLEIGH DICKINSON UNIV	28	503	5.6
328	2690	CUNY QUEENS COLLEGE	27	678	4.0
329	3325	MILLERSVILLE UNIV OF PENN	27	27	100.0
330	2846	SUNY COLLEGE NEW PALTZ	26	67	38.8
331	2208	SIMMONS COLLEGE	25	208	12.0
332	2241	CALVIN COLLEGE	25	25	100.0
333	2625	WILLIAM PATERSON COLLEGE	25	25	100.0
334	2905	NC AG & TECH STATE UNIV	25	2,964	0.8
335	2907	UNIV OF N C AT ASHEVILLE	25	39	64.1
336	3394	WILKES COLLEGE	25	25	100.0
337	3924	UNIV OF WIS-STEVENS POINT	25	197	12.7
338	3944	UNIV OF P R-MAYAGUEZ	25	3,166	0.8
339	1671	DE PAUL UNIVERSITY	24	118	20.3
340	1786	BALL STATE UNIVERSITY	24	28	85.7
341	2039	COLBY COLLEGE	23	23	100.0
342	3367	ST JOSEPH'S UNIVERSITY	23	83	27.7
343	2229	WILLIAMS COLLEGE	22	544	4.0
344	2732	HOFSTRA UNIVERSITY	22	145	15.2
345	3145	YOUNGSTOWN ST UNIVERSITY	22	54	40.7
346	1101	UNIV OF ARK LITTLE ROCK	21	526	4.0
347	1146	CALIF STATE UNIV CHICO	21	21	100.0
348	1422	UNIVERSITY OF HARTFORD	21	61	34.4
349	1674	EASTERN ILLINOIS UNIV	21	26	80.8
350	2017	MCNEESE STATE UNIVERSITY	21	21	100.0
351	2410	JACKSON STATE UNIVERSITY	21	825	2.5
352	2559	PERU STATE COLLEGE	21	21	100.0
353	10875	NORWICH UNIVERSITY	21	21	100.0
354	1542	AGNES SCOTT COLLEGE	19	19	100.0
355	1582	MOREHOUSE COLLEGE	19	653	2.9
356	2072	FROSTBURG STATE COLLEGE	19	19	100.0
357	1173	POMONA COLLEGE	18	170	10.6
358	1873	LORAS COLLEGE	18	18	100.0
359	2343	COLLEGE OF ST SCHOLASTICA	18	18	100.0
360	8780	LONG ISLAND UNIVERSITY	18	143	12.6
361	1169	CLAREMONT GRADUATE SCHOOL	17	131	13.0
362	1249	OCCIDENTAL COLLEGE	17	67	25.4
363	1443	GALLAUDET COLLEGE	17	560	3.0
364	2268	GRAND VALLEY STATE COLS	17	33	51.5
365	1860	DRAKE UNIVERSITY	15	41	36.6
366	2632	SETON HALL UNIVERSITY	15	27	55.6
367	2760	MANHATTANVILLE COLLEGE	15	15	100.0
368	3301	MORAVIAN COLLEGE	15	15	100.0
369	3923	UNIV OF WIS-RIVER FALLS	15	15	100.0
370	2918	DAVIDSON COLLEGE	14	14	100.0
371	1326	UNIVERSITY OF SANTA CLARA	13	793	1.6

INSTITUTIONS RANKED BY FY 1981 NSF R&D OBLIGATIONS 12:38 FRIDAY, MARCH 14, 1986 44
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
372	2975	UNIV OF N C AT CHARLOTTE	13	205	6.3
373	8810	INDIANA UNIV OF PENN	13	18	72.2
374	2728	HAMILTON COLLEGE	12	12	100.0
375	3423	CITADEL MILITARY COL S C	11	11	100.0
376	3704	BRIDGEWATER COLLEGE	11	11	100.0
377	1868	GRINNELL COLLEGE	10	10	100.0
378	2209	SMITH COLLEGE	10	243	4.1
379	2275	KALAMAZOO COLLEGE	10	10	100.0
380	3884	RIPON COLLEGE	10	10	100.0
381	3388	VILLANOVA UNIVERSITY	7	164	4.3
382	2845	SUNY COLLEGE GENESEO	6	31	19.4
383	2671	BARD COLLEGE	5	5	100.0
384	2708	BARNARD COLLEGE	5	285	1.8
385	9635	FLORIDA INTERNATIONAL U	4	47	8.5
386	2843	SUNY COLLEGE CORTLAND	3	24	12.5
387	3353	PHILA COL OF PHARM & SCI	2	108	1.9
388	1208	GROSSMONT COLLEGE	1	1	100.0
			=======	=========	
			616,624	4,410,199	

INSTITUTIONS RANKED BY FY 1982 NSF R&D OBLIGATIONS (THOUSANDS OF DOLLARS) 12:38 FRIDAY, MARCH 14, 1986 25

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
1	1317	UNIV OF CAL SAN DIEGO	33,693	90,896	37.1
2	8779	CORNELL UNIVERSITY	30,623	83,936	36.5
3	2178	MASS INST OF TECHNOLOGY	29,308	148,837	19.7
4	1305	STANFORD UNIVERSITY	24,213	124,289	19.5
5	1775	UNIV OF ILL URBANA	20,216	63,923	31.6
6	2707	COLUMBIA UNIV MAIN DIV	19,834	88,879	22.3
7	1312	UNIV OF CAL BERKELEY	18,320	65,555	27.9
8	3798	UNIVERSITY OF WASHINGTON	16,483	97,690	16.9
9	2230	WOODS HOLE OCNGRPHIC INST	15,980	32,877	48.6
10	3895	UNIV OF WIS-MADISON	14,070	82,417	17.1
11	1131	CALIFORNIA INST OF TECH	12,635	36,672	34.5
12	1315	UNIV OF CAL LOS ANGELES	12,623	89,661	14.1
13	2155	HARVARD UNIVERSITY	11,886	85,757	13.8
14	3378	UNIV OF PENNSYLVANIA	11,528	76,907	15.0
15	9091	UNIVERSITY OF MICHIGAN	11,259	79,794	14.1
16	1774	UNIVERSITY OF CHICAGO	10,625	54,182	19.6
17	8731	INDIANA UNIVERSITY	10,273	30,056	34.2
18	8732	PURDUE UNIVERSITY	10,057	38,142	26.4
19	8761	UNIVERSITY OF MINNESOTA	9,808	78,714	12.5
20	2627	PRINCETON UNIVERSITY	9,574	23,668	40.5
21	1739	NORTHWESTERN UNIVERSITY	8,192	33,117	24.7
22	1426	YALE UNIVERSITY	8,046	78,920	10.2
23	3401	BROWN UNIVERSITY	7,995	18,031	44.3
24	2290	MICHIGAN STATE UNIVERSITY	7,699	35,667	21.6
25	3210	OREGON STATE UNIVERSITY	7,580	33,245	22.8
26	3658	UNIV OF TEXAS AT AUSTIN	6,875	44,767	15.4
27	3242	CARNEGIE-MELLON UNIV	6,749	25,463	26.5
28	1083	UNIVERSITY OF ARIZONA	6,700	35,688	18.8
29	9555	SUNY AT STONY BROOK	6,589	22,221	29.7
30	2221	UNIV OF MASS AT AMHERST	6,427	18,034	35.6
31	2103	UNIV OF MD COLLEGE PARK	6,422	28,355	22.6
32	8813	PENNSYLVANIA STATE UNIV	6,392	50,809	12.6
33	8717	UNIVERSITY OF COLORADO	6,289	43,786	14.4
34	1328	UNIV OF SOUTHERN CAL	5,909	50,402	11.7
35	3632	TEXAS A & M UNIVERSITY	5,901	33,144	17.8
36	8802	OHIO STATE UNIVERSITY	5,832	41,073	14.2
37	3675	UNIVERSITY OF UTAH	5,804	39,886	14.6
38	2077	JOHNS HOPKINS UNIVERSITY	5,727	312,979	1.8
39	3414	UNIV OF RHODE ISLAND	5,598	13,996	40.0
40	1320	UNIV OF CAL SANTA BARBARA	5,504	13,329	41.3
41	8771	RUTGERS THE ST UNIV OF NJ	5,334	17,482	30.5
42	1350	COLORADO STATE UNIVERSITY	5,206	22,614	23.0
43	29094	UNIV OF ALASKA FAIRBANKS	5,075	8,403	60.4
44	2894	UNIVERSITY OF ROCHESTER	4,820	46,427	10.4
45	1536	UNIVERSITY OF MIAMI	4,591	27,070	17.0
46	8815	UNIVERSITY OF PITTSBURGH	4,361	39,397	11.1
47	1313	UNIV OF CAL DAVIS	4,294	32,700	13.1
48	1535	UNIVERSITY OF FLORIDA	4,189	35,106	11.9
49	2920	DUKE UNIVERSITY	4,142	50,397	8.2
50	3024	CASE WESTERN RESERVE UNIV	3,950	34,834	11.3
51	2785	NEW YORK UNIVERSITY	3,887	43,643	8.9
52	1610	UNIV OF HAWAII-MANOA	3,868	20,000	19.3
53	2803	RENSSELAER POLYTECH INST	3,778	12,447	30.4

INSTITUTIONS RANKED BY FY 1982 NSF R&D OBLIGATIONS
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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
54	1314	UNIV OF CAL IRVINE	3,707	22,003	16.8
55	2974	UNIV OF NC AT CHAPEL HILL	3,469	41,890	8.3
56	3604	RICE UNIVERSITY	3,449	8,181	42.2
57	3745	UNIVERSITY OF VIRGINIA	3,391	25,688	13.2
58	1598	UNIVERSITY OF GEORGIA	3,388	16,991	19.9
59	2520	WASHINGTON UNIVERSITY	3,315	52,839	6.3
60	9554	SUNY AT BUFFALO	3,295	16,123	20.4
61	1081	ARIZONA STATE UNIVERSITY	3,210	7,358	43.6
62	1489	FLORIDA STATE UNIVERSITY	3,181	13,410	23.7
63	8718	UNIVERSITY OF CONNECTICUT	3,106	24,972	12.4
64	3754	VA POLYTECH INST & ST U	3,061	18,680	16.4
65	8819	UNIV OF SOUTH CAROLINA	3,018	6,853	44.0
66	2835	SUNY AT ALBANY	2,853	10,900	26.2
67	3223	UNIVERSITY OF OREGON MAIN	2,849	10,374	27.5
68	1431	UNIVERSITY OF DELAWARE	2,769	7,736	35.8
69	3800	WASHINGTON STATE UNIV	2,598	15,262	17.0
70	1840	UNIVERSITY OF NOTRE DAME	2,445	7,036	34.7
71	2972	N C STATE UNIV AT RALEIGH	2,445	18,158	13.5
72	8723	GEORGIA INSTITUTE OF TECH	2,430	43,530	5.6
73	1316	UNIV OF CAL RIVERSIDE	2,385	10,457	22.8
74	1776	UNIV OF ILL CHICAGO	2,384	20,977	11.4
75	1321	UNIV OF CAL SANTA CRUZ	2,249	4,599	48.9
76	1892	UNIVERSITY OF IOWA	2,246	36,971	6.1
77	2133	BRANDEIS UNIVERSITY	2,199	11,558	19.0
78	3289	LEHIGH UNIVERSITY	2,182	5,967	36.6
79	8789	SYRACUSE UNIVERSITY	2,038	8,592	23.7
80	2053	UNIV OF MAINE ORONO	1,814	4,814	37.7
81	2329	WAYNE STATE UNIVERSITY	1,805	12,280	14.7
82	1869	IOWA ST U OF SCI & TECH	1,766	10,869	16.2
83	2130	BOSTON UNIVERSITY	1,761	30,397	5.8
84	8745	LOUISIANA STATE UNIV	1,757	22,141	7.9
85	3932	UNIVERSITY OF WYOMING	1,754	7,069	24.8
86	29001	UNIVERSITY OF KANSAS	1,724	15,450	11.2
87	2565	UNIV OF NEBRASKA-LINCOLN	1,723	11,442	15.1
88	2807	ROCKEFELLER UNIVERSITY	1,612	20,807	7.7
89	3535	VANDERBILT UNIVERSITY	1,598	28,739	5.6
90	3677	UTAH STATE UNIVERSITY	1,598	16,047	10.0
91	2516	UNIV OF MISSOURI COLUMBIA	1,542	15,139	10.2
92	1928	KANS ST U - AG & APP SCI	1,533	8,928	17.2
93	8805	UNIVERSITY OF CINCINNATI	1,497	20,126	7.4
94	8744	UNIVERSITY OF KENTUCKY	1,449	14,764	9.8
95	2532	MONTANA STATE UNIVERSITY	1,443	5,748	25.1
96	2199	NORTHEASTERN UNIVERSITY	1,358	5,032	27.0
97	3530	U TENNESSEE KNOXVILLE	1,353	18,202	7.4
98	2573	DARTMOUTH COLLEGE	1,278	10,161	12.6
99	1319	UNIV OF CAL SAN FRANCISCO	1,236	66,752	1.9
100	3652	U OF HOUSTON UNIV PARK	1,227	5,626	21.8
101	8807	UNIVERSITY OF OKLAHOMA	1,214	10,241	11.8
102	2663	UNIVERSITY OF NEW MEXICO	1,213	24,724	4.9
103	3896	UNIV OF WIS-MILWAUKEE	1,200	1,877	63.9
104	1108	UNIV OF ARK FAYETTEVILLE	1,192	6,357	18.8
105	2589	UNIV OF NEW HAMPSHIRE	1,191	6,624	18.0
106	2688	CUNY CITY COLLEGE	1,108	4,556	24.3

INSTITUTIONS RANKED BY FY 1982 NSF R&D OBLIGATIONS (THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
107	2699	CLARKSON COLLEGE OF TECH	1,081	2,188	49.4
108	3371	TEMPLE UNIVERSITY	1,022	14,816	6.9
109	9741	UNIV OF TEXAS AT DALLAS	1,012	4,965	20.4
110	3827	WEST VIRGINIA UNIVERSITY	1,004	7,558	13.3
111	1151	SAN DIEGO STATE UNIV	995	3,705	26.9
112	3644	TEXAS TECH UNIVERSITY	899	5,825	15.4
113	2903	YESHIVA UNIVERSITY	894	44,237	2.0
114	1564	EMORY UNIVERSITY	859	18,574	4.6
115	2796	POLYTECHNIC INST OF N Y	858	4,074	21.1
116	1445	GEORGETOWN UNIVERSITY	852	12,259	6.9
117	8806	OKLAHOMA STATE UNIVERSITY	849	9,119	9.3
118	1691	ILLINOIS INST OF TECH	844	4,835	17.5
119	1371	UNIVERSITY OF DENVER	842	8,540	9.9
120	8773	NEW MEXICO STATE UNIV	830	21,068	3.8
121	1444	GEORGE WASHINGTON UNIV	765	16,279	4.7
122	3696	UNIV OF VT & ST AGRIC COL	763	13,000	5.9
123	3256	DREXEL UNIVERSITY	745	4,442	16.8
124	2517	UNIV OF MISSOURI ROLLA	726	3,115	23.3
125	8766	ST LOUIS UNIVERSITY	669	7,242	9.2
126	2620	UNIV OF MED & DENT OF N J	641	10,933	5.9
127	8828	COLLEGE OF WILLIAM & MARY	641	1,398	45.9
128	8799	KENT STATE UNIVERSITY	616	1,292	47.7
129	8764	UNIVERSITY OF MISSISSIPPI	613	6,270	9.8
130	2219	TUFTS UNIVERSITY	579	16,808	3.4
131	1448	HOWARD UNIVERSITY	548	8,023	6.8
132	2568	UNIV OF NEVADA - RENO	544	5,348	10.2
133	1155	SAN JOSE STATE UNIVERSITY	542	2,285	23.7
134	2292	MICHIGAN TECH UNIVERSITY	529	3,152	16.8
135	2104	UNIV OF MD BALT PROF SCH	528	22,355	2.4
136	8907	DESERT RESEARCH INSTITUTE	507	891	56.9
137	3438	MED UNIV OF SO CAROLINA	497	7,765	6.4
138	2165	U OF MD BALTIMORE COUNTY	465	1,358	34.2
139	9756	U MASS MED SCHL WORCESTER	460	7,878	5.8
140	2139	CLARK UNIVERSITY	458	824	55.6
141	1537	UNIV OF SOUTH FLORIDA	456	3,370	13.5
142	3470	S DAK SCH MINES & TECH	456	775	58.8
143	7026	CUNY MT SINAI SCH OF MED	435	19,433	2.2
144	2410	JACKSON STATE UNIVERSITY	428	929	46.1
145	1348	COLORADO SCHOOL OF MINES	427	1,838	23.2
146	1052	UNIV ALABAMA BIRMINGHAM	424	28,731	1.5
147	2654	N MEX INST MINING & TECH	423	2,146	19.7
148	3425	CLEMSON UNIVERSITY	417	5,898	7.1
149	3863	MARQUETTE UNIVERSITY	395	1,060	37.3
150	2836	SUNY AT BINGHAMTON	393	2,015	19.5
151	2689	CUNY HUNTER COLLEGE	382	1,808	21.1
152	8856	OREGON GRADUATE CENTER	380	1,356	28.0
153	11618	U TEX H&TH SCI CTR HOUSTN	379	13,896	2.7
154	12318	UNIVERSITY OF AKRON	377	924	40.8
155	1509	NOVA UNIVERSITY	376	509	73.9
156	1434	AMERICAN UNIVERSITY	367	1,079	34.0
157	4949	BAYLOR COL OF MEDICINE	366	36,972	1.0
158	3378	SWARTHMORE COLLEGE	365	461	79.2
159	3613	SOUTHERN METHODIST UNIV	365	1,254	29.1

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
160	7108	UNIV OF P R-RIO PIEDRAS	363	3,874	9.4
161	1737	NORTHERN ILLINOIS UNIV	348	1,110	31.4
162	1424	WESLEYAN UNIVERSITY	346	1,589	21.8
163	1999	UNIVERSITY OF LOUISVILLE	346	3,863	9.0
164	3735	VIRGINIA COMMONWLTH UNIV	336	16,485	2.0
165	3660	U TEX HLTH SCI CTR DALLAS	327	23,966	1.4
166	2128	BOSTON COLLEGE	321	4,800	6.7
167	4063	CUNY GRAD SCH & UNIV CTR	320	1,357	23.6
168	2536	UNIVERSITY OF MONTANA	311	1,535	20.3
169	2222	UNIV OF MASS BOSTON	309	1,339	23.1
170	1626	UNIVERSITY OF IDAHO	303	4,832	6.3
171	8803	OHIO UNIVERSITY	302	1,424	21.2
172	1437	CATHOLIC UNIV OF AMERICA	300	1,659	18.1
173	3659	U TEX HLTH SCI CTR S ANTO	288	14,456	2.0
174	3185	UNIVERSITY OF TULSA	284	628	45.2
175	1574	GEORGIA STATE UNIVERSITY	277	1,174	23.6
176	3131	UNIVERSITY OF TOLEDO	269	722	37.3
177	2029	TULANE UNIVERSITY	268	8,839	3.0
178	3594	NORTH TEXAS STATE UNIV	265	1,939	13.7
179	8001	UNIV OF ILLINOIS SYS OFF	250	453	55.2
180	2233	WORCESTER POLY INSTITUTE	248	1,119	22.2
181	2690	CUNY QUEENS COLLEGE	246	942	26.1
182	2687	CUNY BROOKLYN COLLEGE	235	784	30.0
183	1551	ATLANTA UNIVERSITY	229	1,004	22.8
184	2161	UNIVERSITY OF LOWELL	221	1,716	12.9
185	2894	HARTFORD GRADUATE CENTER	219	219	100.0
186	1051	THE UNIVERSITY OF ALABAMA	218	1,028	21.2
187	2851	SUNY COL OF ENV SCI & FOR	216	626	34.5
188	12305	BRIGHAM YOUNG UNIVERSITY	216	2,121	10.2
189	2621	N J INST OF TECHNOLOGY	200	439	45.6
190	8794	UNIVERSITY OF N DAKOTA	200	4,435	4.5
191	1140	CALIF ST UNIV LOS ANGELES	198	240	82.5
192	1807	INDIANA STATE UNIVERSITY	198	506	39.1
193	8800	MIAMI UNIVERSITY (OHIO)	198	729	27.2
194	9266	NORTH DAKOTA STATE UNIV	195	3,250	6.0
195	2686	CUNY CENTRAL SYS OFF	176	176	100.0
196	8296	MEDICAL COLLEGE OF WIS	169	8,290	2.0
197	6895	U OF NEB MED CTR AT OMAHA	165	3,134	5.3
198	2115	AMHERST COLLEGE	163	717	22.7
199	8796	BOWLING GREEN STATE UNIV	162	715	22.7
200	1579	MEDICAL COL OF GEORGIA	160	6,119	2.6
201	3802	WESTERN WASHINGTON UNIV	159	184	86.4
202	3398	THE MEDICAL COL OF PENNA	158	2,963	5.3
203	1143	CAL POLY ST U SAN LUIS OB	156	432	36.1
204	1582	MOREHOUSE COLLEGE	155	685	22.6
205	2639	STEVENS INSTITUTE OF TECH	154	2,606	5.9
206	3237	BRYN MAWR COLLEGE	149	472	31.6
207	1050	TUSKEGEE INSTITUTE	146	1,836	8.0
208	1481	FLORIDA ATLANTIC UNIV	145	290	50.0
209	2923	EAST CAROLINA UNIVERSITY	145	834	17.4
210	3434	FURMAN UNIVERSITY	144	144	100.0
211	1139	CALIF ST UNIV LONG BEACH	143	393	36.4
212	3086	OBERLIN COLLEGE	143	199	71.9

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OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
213	1137	CALIF ST UNIV FULLERTON	142	363	39.1
214	2978	WAKE FOREST UNIVERSITY	142	10,116	1.4
215	3274	HAVERFORD COLLEGE	142	185	76.8
216	4952	U TEX MED BRNCH GALVESTON	141	10,057	1.4
217	1082	NORTHERN ARIZONA UNIV	131	329	39.8
218	3728	OLD DOMINION UNIVERSITY	128	2,431	5.3
219	9167	WRIGHT STATE UNIVERSITY	128	2,629	4.9
220	7022	CUNY LEHMAN COLLEGE	126	212	59.4
221	1055	UNIV ALABAMA HUNTSVILLE	125	2,142	5.8
222	7737	MED COL OF OHIO AT TOLEDO	123	4,484	2.7
223	8695	AUBURN UNIVERSITY	120	6,714	1.8
224	3265	FRANKLIN & MARSHALL COL	116	237	48.9
225	3979	COLUMBIA U TEACHERS COL	115	790	14.6
226	1153	CALIF ST UNIV NORTHRIDGE	110	364	30.2
227	2210	SOUTHEASTERN MASS UNIV	108	352	30.7
228	3509	MEMPHIS STATE UNIVERSITY	106	503	21.1
229	1249	OCCIDENTAL COLLEGE	105	138	76.1
230	2632	SETON HALL UNIVERSITY	104	261	39.8
231	2840	SUNY UPSTATE MEDICAL CTR	102	4,650	2.2
232	3474	UNIV OF SOUTH DAKOTA	100	803	12.5
233	1057	UNIV OF SOUTH ALABAMA	99	3,351	3.0
234	3238	BUCKNELL UNIVERSITY	98	98	100.0
235	3367	ST JOSEPH'S UNIVERSITY	97	194	50.0
236	4661	HAMPSHIRE COLLEGE	97	97	100.0
237	2617	MONTCLAIR STATE COLLEGE	96	156	61.5
238	3954	UNIV OF CENTRAL FLORIDA	94	1,774	5.3
239	1154	SAN FRANCISCO STATE UNIV	92	682	13.5
240	1710	LOYOLA UNIV - CHICAGO	92	2,465	3.7
241	1173	POMONA COLLEGE	90	419	21.5
242	2423	MISSISSIPPI STATE UNIV	90	9,056	1.0
243	8155	EVERGREEN STATE COLLEGE	90	100	90.0
244	2314	SAGINAW VALLEY STATE COL	87	87	100.0
245	1171	HARVEY MUDD COLLEGE	86	149	57.7
246	3217	REED COLLEGE	85	371	22.9
247	2015	UNIVERSITY OF NEW ORLEANS	84	613	13.7
248	3487	EAST TENNESSEE STATE UNIV	81	264	30.7
249	2031	UNIV OF SOUTHWESTERN LA	78	186	41.9
250	2701	COLGATE UNIVERSITY	78	78	100.0
251	1147	CALIF STATE UNIV FRESNO	77	121	63.6
252	3636	TEXAS CHRISTIAN UNIV	77	1,552	5.0
253	29342	ST VINCENT COL AND SEM	77	77	100.0
254	3749	GEORGE MASON UNIVERSITY	76	313	24.3
255	2666	ADELPHI UNIVERSITY	75	219	34.2
256	2732	HOFSTRA UNIVERSITY	75	121	62.0
257	1347	COLORADO COLLEGE	74	74	100.0
258	2975	UNIV OF N C AT CHARLOTTE	74	301	24.6
259	2984	UNIV OF N C AT WILMINGTON	73	123	59.3
260	1671	DE PAUL UNIVERSITY	72	72	100.0
261	8795	ANTIOCH UNIVERSITY	72	72	100.0
262	2036	BATES COLLEGE	70	70	100.0
263	2518	UNIV OF MISSOURI KAN CITY	70	339	20.6
264	2229	WILLIAMS COLLEGE	69	203	34.0
265	2519	UNIV OF MISSOURI ST LOUIS	69	316	21.8

(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
266	1758	SOUTHERN ILL U-CARBONDALE	68	3,535	1.9
267	2224	WELLESLEY COLLEGE	68	227	30.0
268	3037	COLLEGE OF WOOSTER	66	88	75.0
269	1950	WICHITA STATE UNIVERSITY	65	300	21.7
270	6967	BAYLOR UNIVERSITY	65	359	18.1
271	10115	U OF TEXAS AT SAN ANTONIO	65	911	7.1
272	2889	UNION COLLEGE (NY)	63	143	44.1
273	2358	MACALESTER COLLEGE	62	62	100.0
274	2823	ST JOHN'S UNIVERSITY (NY)	61	74	82.4
275	1325	UNIV OF SAN FRANCISCO	60	422	14.2
276	2569	UNIV OF NEVADA LAS VEGAS	60	1,229	4.9
277	3924	UNIV OF WIS-STEVENS POINT	60	132	45.5
278	1612	U OF HAWA-HONOLULU COM C	59	59	100.0
279	2928	FAYETTEVILLE STATE UNIV	58	58	100.0
280	3945	UNIV OF P R-MED SCI CMPUS	58	2,996	1.9
281	6725	UNIV TENN CTR HEALTH SCI	58	6,945	0.8
282	4766	CUNY BERNARD BARUCH COL	57	57	100.0
283	1326	UNIVERSITY OF SANTA CLARA	56	1,006	5.6
284	2839	SUNY DOWNSTATE MED CTR	56	7,137	0.8
285	2323	UNIVERSITY OF DETROIT	55	436	12.6
286	3388	VILLANOVA UNIVERSITY	55	204	27.0
287	2668	ALFRED UNIVERSITY	54	54	100.0
288	1416	UNIVERSITY OF BRIDGEPORT	53	53	100.0
289	1149	HUMBOLDT STATE UNIVERSITY	52	178	29.2
290	2238	ANDREWS UNIVERSITY	52	52	100.0
291	3625	SUL ROSS STATE UNIVERSITY	52	52	100.0
292	1954	BELLARMINE COLLEGE	51	51	100.0
293	2722	FORDHAM UNIVERSITY	51	565	9.0
294	3656	UNIV OF TEX AT ARLINGTON	51	270	18.9
295	3835	BELOIT COLLEGE	51	51	100.0
296	2307	OAKLAND UNIVERSITY	50	1,728	2.9
297	2842	SUNY COLLEGE BUFFALO	50	135	37.0
298	3065	KENYON COLLEGE	50	77	64.9
299	2153	GORDON COLLEGE	49	49	100.0
300	3127	UNIVERSITY OF DAYTON	49	17,094	0.3
301	3581	LAMAR UNIVERSITY	49	49	100.0
302	1329	UNIVERSITY OF THE PACIFIC	48	508	9.4
303	3216	PORTLAND STATE UNIVERSITY	48	569	8.4
304	4882	OREGON HLTH SCIENCES UNIV	46	9,546	0.5
305	1353	FORT LEWIS COLLEGE	45	49	91.8
306	3661	UNIV OF TEXAS AT EL PASO	45	107	42.1
307	1414	TRINITY COLLEGE	41	105	39.0
308	2441	UNIV OF STHRN MISSISSIPPI	41	483	8.5
309	2147	EMMANUEL COLLEGE	40	1,050	3.8
310	3753	VIRGINIA MILITARY INST	40	67	59.7
311	1230	MILLS COLLEGE	39	39	100.0
312	3894	UNIV OF WISCONSIN SYS OFF	38	3,446	1.1
313	1572	GEORGIA SOUTHERN COLLEGE	37	152	24.3
314	2816	SIENA COLLEGE	37	37	100.0
315	2918	DAVIDSON COLLEGE	37	37	100.0
316	3624	STEPHEN F AUSTIN ST UNIV	37	231	16.0
317	1322	UNIVERSITY OF REDLANDS	35	35	100.0
318	2141	COL OF THE HOLY CROSS	35	83	42.2

INSTITUTIONS RANKED BY FY 1982 NSF R&D OBLIGATIONS
(THOUSANDS OF DOLLARS)

OBS	FICE	INSTITUTION	NSF R&D OBLIGATIONS	TOTAL R&D OBLIGATIONS	NSF R&D OBLIGATIONS AS PERCENT OF TOTAL
319	2728	HAMILTON COLLEGE	35	35	100.0
320	2976	UNIV OF N C AT GREENSBORO	35	113	31.0
321	3408	CMTY COL OF RHODE ISLAN	35	35	100.0
322	1101	UNIV OF ARK LITTLE ROCK	34	594	5.7
323	3797	UNIVERSITY OF PUGET SOUND	34	34	100.0
324	1109	U OF ARKANSAS MED SCI CAM	33	2,048	1.6
325	2739	ITHACA COLLEGE	33	33	100.0
326	1385	FAIRFIELD UNIVERSITY	32	32	100.0
327	1674	EASTERN ILLINOIS UNIV	32	32	100.0
328	2846	SUNY COLLEGE NEW PALTZ	32	32	100.0
329	3145	YOUNGSTOWN ST UNIVERSITY	32	60	53.3
330	3768	WASHINGTON & LEE UNIV	32	32	100.0
331	3733	RANDOLPH-MACON COLLEGE	31	31	100.0
332	2784	NEW YORK MEDICAL COLLEGE	30	4,175	0.7
333	2834	SUNY SYSTEM OFFICE	30	34	88.2
334	2273	HOPE COLLEGE	29	240	12.1
335	1780	WESTERN ILLINOIS UNIV	28	73	38.4
336	1146	CALIF STATE UNIV CHICO	27	47	57.4
337	2241	CALVIN COLLEGE	27	27	100.0
338	8770	FAIRLEIGH DICKINSON UNIV	27	511	5.3
339	2841	SUNY COLLEGE BROCKPORT	25	25	100.0
340	2906	APPALACHIAN ST UNIVERSITY	25	25	100.0
341	2981	WESTERN CAROLINA UNIV	25	214	11.7
342	3253	DICKINSON COLLEGE	25	25	100.0
343	3785	PACIFIC LUTHERAN UNIV	25	120	20.8
344	3788	SEATTLE PACIFIC UNIV	24	24	100.0
345	9630	UNIV OF WIS-OSHKOSH	23	23	100.0
346	1542	AGNES SCOTT COLLEGE	22	22	100.0
347	29040	CUNY COL STATEN ISLAND	22	95	23.2
348	2503	SOUTHWEST MISSOURI ST U	21	71	29.6
349	3458	AUGUSTANA COLLEGE	21	79	26.6
350	3691	MIDDLEBURY COLLEGE	20	49	40.8
351	1466	BARRY UNIVERSITY	19	85	22.4
352	2531	MONT COL MINRL SCI & TECH	19	162	11.7
353	2542	CREIGHTON UNIVERSITY	19	703	2.7
354	1169	CLAREMONT GRADUATE SCHOOL	17	100	17.0
355	1150	CALIF ST UNIV SACRAMENTO	15	75	20.0
356	1402	QUINNIPIAC COLLEGE	15	112	13.4
357	3837	CARDINAL STRITCH COLLEGE	14	14	100.0
358	1704	KNOX COLLEGE	13	82	15.9
359	3599	PAN AMERICAN UNIVERSITY	13	21	61.9
360	7993	CALIF ST COL BAKERSFIELD	13	13	100.0
361	2343	COLLEGE OF ST SCHOLASTICA	12	223	5.4
362	2121	BABSON COLLEGE	10	10	100.0
363	8701	ARKANSAS STATE UNIVERSITY	9	9	100.0
364	2780	NEW SCH FOR SOC RESEARCH	8	51	15.7
365	3680	WEBER STATE COLLEGE	8	75	10.7
366	9635	FLORIDA INTERNATIONAL U	8	551	1.5
367	2009	LA ST UNIV SYSTEM OFFICE	7	1,102	0.6
368	1793	EARLHAM COLLEGE	6	6	100.0
369	2625	WILLIAM PATERSON COLLEGE	6	6	100.0
370	2708	BARNARD COLLEGE	6	275	2.2
371	2849	SUNY COLLEGE PLATTSBURGH	6	190	3.2

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                        INSTITUTIONS RANKED BY FY 1982 NSF R&D OBLIGATIONS       12:38 FRIDAY, MARCH 14, 1986   32
                                          (THOUSANDS OF DOLLARS)

OBS    FICE    INSTITUTION                     NSF R&D OBLIGATIONS       TOTAL R&D     NSF R&D OBLIGATIONS
                                                                        OBLIGATIONS    AS PERCENT OF TOTAL

372    7109    SUNY COL AT OLD WESTBURY                  6                     6              100.0
                                                   =======             =========
                                                   689,692             4,553,755
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FEDERAL EMERGENCY MANAGEMENT AGENCY

STATEMENT OF GENERAL JULIUS W. BECTON, JR., DIRECTOR

ACCOMPANIED BY:
- WILLIAM C. TIDBALL, DEPUTY CHIEF OF STAFF
- BERNARD A. MAGUIRE, ASSOCIATE DIRECTOR, NATIONAL PREPAREDNESS PROGRAMS
- JEFFREY S. BRAGG, ADMINISTRATOR, FEDERAL INSURANCE ADMINISTRATION
- WILLIAM F. W. JONES, COMPTROLLER
- SAMUEL W. SPECK, ASSOCIATE DIRECTOR, STATE AND LOCAL PROGRAMS AND SUPPORT
- JAMES P. McNEILL, ASSOCIATE DIRECTOR, TRAINING AND FIRE PROGRAMS
- CLYDE A. BRAGDON, JR., ADMINISTRATOR, U.S. FIRE ADMINISTRATION
- WILLIAM F. WILLIAMS, ACTING ASSOCIATE DIRECTOR, EMERGENCY OPERATIONS

OPENING REMARKS

Senator GARN. General Becton, I want to welcome you and your staff here for the first hearing before the subcommittee.

FEMA is responsible for supervising Federal efforts to anticipate, prepare for, and respond to major civil emergencies. The Agency works to ensure the effectiveness of the National Civil Defense Program, as well as the availability of civil defense systems and resources in coping with all major disasters.

FEMA coordinates the programs aimed at preventing and mitigating the effects of potential disasters and the programs designed to deal with these disasters once they occur. This year, FEMA is requesting $250,743,000 for emergency management planning and assistance—$18 million increase over the fiscal year 1986 request—$100 million for the Disaster Relief Fund, which is a $94 million decrease from the fiscal year 1986 request; no funds for the National Flood Insurance Fund; $118,507,000 for salaries and expenses—a $2.8 million increase over the fiscal year 1986 request—once again, no funds for emergency food and shelter.

Before you proceed with your statement, I understand that your Agency did not comply with the subcommittee's deadline as to when your opening statement, as well as other materials, were due in the office. The importance of that is not that we are sitting up here making up arbitrary deadlines. The time is necessary to give the staff an opportunity to provide copies to the members of the committee, to review your budget submission, and to be better prepared to conduct the hearings. Each year, a member of my staff takes the time to meet with all 18 agencies by the end of January to go over the deadline dates for hearing material and transcript instructions, and my staff is certainly always available to answer any questions, especially for those who are new to the Agency and haven't been before the subcommittee before.

So I would hope in the future, we will be able to have it. Again, I say it only from the standpoint of trying to do our job better. Please proceed.

General BECTON. Mr. Chairman, I am glad to be here. I first apologize for having failed to get the material to the committee and the committee members on time. I assure you, I intend to meet that deadline in the future.

INTRODUCTION OF ASSOCIATES

With me today are the senior members of the FEMA family. I would like to introduce them to you, sir. Starting from my extreme right, I have Bill Tidball, Deputy Chief of Staff; Bernard Maguire, the Associate Director of National Preparedness Programs; Jeff Bragg, the Federal Insurance Administrator; and Bill Jones, our Comptroller. On my left is Sam Speck, the Associate Director for State and Local Programs and Support; Jim McNeill, the Associate Director for Training and Fire Programs; Clyde Bragdon, Administrator, U.S. Fire Administration, and Bill Williams, the Acting Associate Director for Emergency Operations.

In order to provide more time, sir, for your questions, I would like to submit my prepared statement for the record and proceed, if I could, with a brief opening.

Senator GARN. Yes, we would be happy to put your full statement in the record at the conclusion of your oral comments.

OVERVIEW OF FEMA'S REQUEST

General BECTON. I welcome the opportunity to appear here. As you point out, this is my first appearance before your subcommittee. I became the Director of FEMA in November of last year, and I can tell you that my first 4 months—it will be 4 months in 2 days—at FEMA have not been dull.

A great deal of my time has been taken up with budget matters interspersed with natural disasters in Virginia, West Virginia, Pennsylvania, New York, and more recently, on the west coast, California, and Nevada, to include your State, sir.

During this period, I was also able to visit all 10 of the FEMA regions. Additionally, we have had a wide variety of other things to keep us busy, such as more than 250 open court litigations and a fairly large number of GAO and IG audits and reviews.

Based upon my observation and reports of all the people who have given me information, I am proud to report that FEMA is fulfilling its mission, which is to serve the public in time of emergency and to assist State and local governments in their preparedness roles.

My highest priority has been, however, to establish credibility and integrity within the FEMA family, as well as the competence of the Agency. I believe we are on the right track.

The total President's budget for FEMA's appropriations is $469,-250,000 and 2,315 work-years. This is a decrease of some $393,552,000 and an increase of 11 work-years.

Most of this decrease is due to a one-time, fiscal year 1986 request for a supplemental in the Disaster Relief Fund of a quarter of a billion dollars and no request for food and shelter program funds. The decrease of $30,362,000 in the operating accounts is necessary to reach the targeted level in fiscal year 1987 under the Balanced Budget Emergency Deficit Control Act.

The FEMA request reflects the need to reduce expenditures and, ultimately, the deficit. To do this, the request is generally at or close to the levels established in fiscal year 1986 after the Gramm-Rudman-Hollings cut. In order to reach the fiscal year 1987 levels, it requires several actions: A resubmission of savings proposed in prior years. In some cases, we propose to terminate certain programs. It requires an acceleration of increases in premiums for flood insurance policies. It also requires more cost sharing by State and local governments for training, as well as disaster assistance.

CIVIL DEFENSE

Notwithstanding those reductions, the requested amounts will enable us to maintain our programs generally close to their present level. I would like to offer a few words about each key program. You mentioned civil defense. Fiscal year 1987 will be another maintenance year at generally the same level of activity as in fiscal year 1986. Another significant feature is greater cost sharing for civil defense training. A revised policy is currently under development.

RADIOLOGICAL EMERGENCY PREPAREDNESS

Under Radiological Emergency Preparedness, generally, the funding is level. Half of the program costs would be offset by fees to be paid by nuclear powerplant owners for off-site emergency response planning. We also propose that these fees be collected by the NRC and deposited in the Treasury.

FEDERAL PREPAREDNESS

Next, Federal Preparedness. We propose an increase in the Government preparedness program of $32,429,000 and 28 workyears. This will be partially offset by decreases in the resources preparedness and mobilization preparedness programs. Additionally, we are working with other Federal agencies, as well as State and local authorities, in preparing to deal with the consequences of terrorism in the event such acts were to occur on a major scale.

U.S. FIRE ADMINISTRATION

We propose elimination of the funding for the U.S. Fire Administration. This will save some $7,364,000 and 22 workyears, which is necessary to help us reach our Gramm-Rudman-Hollings target.

We are asking State and local governments, as well as the private sector, to support and maintain these programs. I hasten to add, sir, that this proposal does not reflect the quality of the Fire Administration programs, nor does it signal a lack of support for our Nation's firefighters.

WESTERN TRAINING FACILITY

There are no funds requested for the Western Training Facility. In my judgment, the student demands for such a center will be insufficient due to the negative impact on the student load at Emmitsburg as a result of required cost sharing. Associated with this zero funding of NETC West, we will ask for a reprogramming of fiscal year 1986 funds to partially offset the Gramm-Rudman-Hollings reductions.

COST SHARING FOR TRAINING

The proposed cost sharing for training at the NETC at Emmitsburg is part of a governmentwide initiative. Such cost sharing by State and local governments for student travel will save $2.5 million. An additional $1,020,000 in savings is estimated by cost sharing for lodging.

NATIONAL FLOOD INSURANCE PROGRAM

Our Flood Insurance Program request is identical to that of fiscal year 1986, except for when the funds become self-sufficient, which will be one year earlier; that is, fiscal year 1987 as opposed to 1988. We expect all costs to be paid for out of the fund. Our proposal includes an estimated maximum rate increase of 27 percent.

DISASTER RELIEF

As you pointed out, we are requesting $100 million for disaster relief, accompanied by legislative proposals and regulatory changes to increase State and local cost sharing. Of special importance is our fiscal year 1986 supplemental request for a quarter of a billion dollars due to the adverse experiences earlier this year. This supplemental is necessary to avoid depletion of the fund by early spring.

MANAGEMENT AND ADMINISTRATION

Our last key program is management and administration. Our fiscal year 1987 request continues substantial reductions already made in this activity. It amounts to 113 workyears and $4,615,000 less than the actual spending level in fiscal year 1985.

Mr. Chairman, again, I appreciate the opportunity to appear before your committee. I look forward to your questions. I have asked my colleagues not to be reluctant to speak up if they have expertise in a particular subject area.

[The statement follows:]

STATEMENT

OF

THE HONORABLE JULIUS W. BECTON, JR.

DIRECTOR

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEFORE

THE SUBCOMMITTEE ON HUD-INDEPENDENT AGENCIES

COMMITTEE ON APPROPRIATIONS

UNITED STATES SENATE

MARCH 5, 1986

Mr. Chairman and Members of the Subcommittee:

We appear before you today to present testimony on the budget request of the Federal Emergency Management Agency (FEMA) for Fiscal Year 1987.

The total requested for all appropriations is $469,250.000. The outlay request is $589,567,000; and FEMA's full-time equivalent needs are estimated at 2,315. Compared to 1986, appropriations decrease by $393,552,000, outlays decrease by $357,094,000, and full-time equivalents increase by 11. The major reason for these decreases is the one-time request in 1986 for a supplemental for the Disaster Relief Fund. The 1987 Budget request for FEMA operating accounts is $369,250,000, a decrease of $30,362,000 under 1986. The specifics of these changes are detailed in the Budget Justification.

In line with the need to reduce the Federal deficit, the budget request for 1987 for operating programs is close to those levels established after reductions are taken under the Balanced Budget and Emergency Deficit Control Act of 1985 in most programs. The major exceptions are the Government Preparedness program which has a major increase, the Training and Fire programs which have a major decrease, and Flood Plain Management and administering the National Flood Insurance Program for which support is requested through the National Flood Insurance Fund. Reaching the levels mandated for 1987 by this legislation will require more cost sharing on the part of State and local governments, private organizations and individuals as well as the elimination of some programs.

BALANCED BUDGET AND EMERGENCY DEFICIT CONTROL ACT OF 1985

The 1986 appropriated levels for the Salaries and Expenses, Emergency Management Planning and Assistance and the Disaster Relief Appropriations have been reduced by 4.3 percent in order to comply with the provisions of the Balanced Budget and Emergency Deficit Control Act of 1985. In addition, the administrative expenses of the National Insurance Development Fund and $10,000,000 in funds intended for grants to States to assist them in setting up their own crime insurance programs have been reduced by 4.3 percent. The 1986 columns of our Budget Justifications reflect the 4.3 percent reduction in all programs as required by statute. I wish to advise the Committee that FEMA intends to propose a reprogramming action in order to maintain the Federal, State and local infrastructure while reducing some programs targeted for elimination in 1987.

CIVIL DEFENSE

The request for the Civil Defense Programs is $126,565,000 and 508 workyears, a decrease of $4,250,000 and an increase of 8 workyears from the 1986 current level. This is an overall reduction of 3 percent with one-half of this amount being made up by State and local government through higher cost sharing in resident training at the FEMA National Emergency Training Center. Deficit reduction necessitates proposing a second year of retrenchment in Civil Defense. During 1986, direction of the program is being addressed.

The Civil Defense Activity seeks to stress the preparedness elements common to all emergencies and at the same time to address and strengthen those elements unique to specific types of emergencies. Preparedness for natural disasters, such as hurricanes or floods, and preparedness for man-made calamities, such as chemical spills or nuclear attack, are in many respects interchangeable. Response and recovery capabilities common to most emergencies are obtained through preparedness programs that address warning, direction and control, resource management, evacuation, in-place sheltering, maintenance of law and order, health and medical services, and government preparedness. These capabilities are obtained through emergency planning, development of supporting systems, and training and education programs with the ultimate objective being to save lives and protect property threatened by any and all hazards. During 1987, FEMA will continue to revise guidance and develop support materials which will assist State and local governments in building functional emergency management capabilities. Civil Defense funds made available to States for attack preparedness may be used for preparing for, and providing emergency assistance in response to, peacetime disasters to the extent such use is consistent with, contributes to, and does not detract from attack-related preparedness.

COMPREHENSIVE EMERGENCY PREPAREDNESS PLANNING

The request for Comprehensive Emergency Preparedness Planning is $9,035,000 and 61 workyears, an increase of $408,000 and 10 workyears over the 1986 current level.

This increase of $408,000 reflects restoration of reductions under the Balanced Budget and Emergency Deficit Control Act of 1985, amounts necessary for within-grade increases and increases for cost inflation in other objects of expense. The increase in workyears is requested to enable the Agency to achieve the targeted workyears in the 1986 Current Estimates. The Comprehensive Emergency Preparedness Planning activity is designed to enhance State and local capabilities to prepare for, respond to, and mitigate disasters and emergencies arising from earthquakes, hurricanes, hazardous materials incidents, and unsafe dams. Of particular note are the Disaster Preparedness Improvement Grants Program through which Disaster Relief Fund monies are provided to States for natural disaster preparedness and prevention planning and the Earthquake Program which enables FEMA to carry out its lead Agency responsibilities under the Congressionally mandated National Earthquake Hazards Reduction Program (NEHRP).

RADIOLOGICAL EMERGENCY PREPAREDNESS

The request for Radiological Emergency Preparedness is 60 workyears and $6,500,000, an increase of $302,000 and a decrease of 2 workyears from 1986. In 1987, legislation will be proposed to establish a fee structure through the Nuclear Regulatory Commission so that the owners of commercial nuclear power plants would reimburse the Treasury for 50 percent of the costs associated with offsite emergency response planning. For example, of the $6,500,000 and 60 workyears requested for this program in 1987, $3,250,000 would be collected by the Nuclear Regulatory Commission (NRC) and forwarded to the Treasury to offset the costs of this program. Similar legislation will be proposed by the NRC.

FEDERAL PREPAREDNESS

The request for Federal Preparedness is $177,911,000 and 897 workyears, an increase of $32,486,000 and 16 workyears over 1986. The major portion of this increase is in the Government Preparedness program, partially offset by reductions in the Resources Preparedness and Mobilization Preparedness programs.

The 5 workyear reduction in Resources Preparedness is in the natural resources planning activity. The reduction of 6 workyears in the Mobilization Preparedness program reflects a reduction of 3 workyears for the National Defense Executive Reserve, 2 workyears for Mobilization Exercises, and 1 workyear for mobilization planning activities.

TRAINING AND FIRE PROGRAMS

The request for Training and Fire Programs is $11,914,000 and 84 workyears, a decrease of $10,493,000 and 4 workyears. The reduction is attributable to elimination of the U.S. Fire Administration and no funding requested for a western training facility, student travel stipends and costs associated with providing lodging at the Emmitsburg campus, as discussed below.

U.S. Fire Administration

The 1987 request proposes the elimination of the U.S. Fire Administration for a savings of $7,364,000 and 22 workyears, made necessary to reach Gramm-Rudman-Hollings targets.

In calling for elimination of the United States Fire Administration in 1987, we are asking the State and local governments, the private sector and volunteer organizations to share in the supporting and maintaining of the fire safety programs. For example, the "Partnerships in Fire" program provides small grants to local community organizations for local fire prevention activities. This is a popular program, and worthwhile; however, it could be performed by states and localities without Federal money.

Let me state very clearly that the elimination of the U. S. Fire Administration does not reflect on the quality of the programs. The reality of the deficit is such that in developing this budget, all programs have been scrutinized. In no way should these actions be interpreted as a lack of support for the Nation's firefighters. For over a decade, the U. S. Fire Administration has provided a coordinated Federal focus for State and local fire prevention and protection initiatives. Much of our effort has been to build the capacity in communities to sustain fire safety programs. Eliminating programs is not an easy decision, even if it is a necessary one. We feel that many of the programs initiated by the U. S. Fire Administration can and will be continued at the State and local level.

Western Training Facility

No funds are requested for the establishment or operation of a western training facility. The demand for training appears insufficient to justify a new institution. Moreover, the number of students applying for training will probably decline as a result of the requirement for higher levels of State and local cost sharing for training at the National Emergency Training Center. Elimination of funding for a western training campus results in a reduction of $2,118,000 and one workyear below the 1986 level, for both Civil Defense and Training and Fire Programs.

As part of its reprogramming request in 1986, FEMA will propose deleting funds available in 1986 for the western training facility.

Cost Sharing for Training

The 1987 request includes a government-wide initiative to require more State and local cost sharing for training. FEMA proposes that students pay for their own travel to training courses at our National Emergency Training Center and also pay a lodging fee. This lodging fee, estimated at $1,020,000 for civil defense and non-civil defense programs, will be collected and used by FEMA to provide for part of the cost of maintenance at the resident training facility in Emmitsburg, Maryland. The reduction for travel stipends will save the Federal Government a total of $2,500,000 in civil defense and non-civil defense programs. The Federal Government will continue to pay a significant share of the costs at Emmitsburg including instructors' salaries, supplies, site administration, utilities, local travel and the like. Additional cost sharing will not lessen the excellence of our academic offerings.

FLOOD PLAIN MANAGEMENT
AND
NATIONAL FLOOD INSURANCE FUND

In 1987, FEMA proposes to make the National Flood Insurance Fund self-support- ing and to fund both the Flood Plain Management Program and the administrative costs associated with the National Flood Insurance Program from the National Flood Insurance Fund. This is identical to the 1986 proposal with one exception: the fund will be self-sufficient one year earlier, i.e., in 1987 rather than in 1988.

The estimates for 1987 include a maximum premium increase of approximately 27 percent. However, the approach actually used to reach the self-supporting goal will involve a smaller premium increase combined with coverage changes and optional deductibles. The combined effect will eliminate the Federal subsidy for this activity and shift the burden from the taxpayer to those who are the primary beneficiaries. No appropriation is requested in 1987 for debt payment.

MANAGEMENT AND ADMINISTRATION

The request for Management and Administration is $30,738,000 and 354 workyears, an increase of $2,662,000 over 1986 and a decrease of 21 workyears. Importantly, in addition to the restoration of the 1986 Gramm-Rudman-Hollings reductions, this increase includes $1,064,000 to restore Standard Level User Charges not included in the 1986 Budget and $246,000 to permit the Agency to maintain the minimal level of administrative support necessary for efficient operation. The increase is also essential to pay for increases in the cost of operations at or below current levels of activity. These increases are imposed by suppliers and include such items as space rental, telephones, supplies, maintenance and machine rentals.

NATIONAL INSURANCE DEVELOPMENT FUND

The 1987 request for the crime insurance program assumes that this program will end on March 17, 1986, as provided for in P.L. 99-219.

DISASTER RELIEF FUND

For 1986, FEMA requests a supplemental of $250,000,000 because of the large numbers of declared disasters as well as the high cost of some of these disasters in the fall of 1985.

For 1987 and beyond, legislation to amend the Disaster Relief Act of 1974 and changes to regulations are being developed that propose to reduce the Federal share of funding for disaster assistance. Cost sharing at approximately 75 percent Federal funding and 25 percent State and local funding will be applied to Individual Assistance, and a sliding scale of cost-sharing will be applied to Public Assistance to achieve an overall 50 percent Federal and 50 percent State and local cost sharing. This sliding scale will ensure appropriate Federal support for exceptionally severe disasters. The budget request for 1987 is $100,000,000 which will be augmented by $50,000,000 in anticipated recoveries from declared disasters where, in effect, the actual costs of disaster assistance were less than the amounts estimated and obligated.

EMERGENCY FOOD AND SHELTER

No funding is requested for the Emergency Food and Shelter program for 1987.

Thank you, Mr. Chairman. My staff and I will be pleased to answer any questions.

PREPARED STATEMENT

Senator GARN. Senator D'Amato.

Senator D'AMATO. I would ask, Mr. Chairman, that I be permitted to submit a full statement as if read in its entirety for the record.

Senator GARN. Certainly.

[The statement follows:]

STATEMENT OF SENATOR ALFONSE D'AMATO

Mr. Chairman, I am pleased that you are holding this hearing on the fiscal year 1987 budget for the Federal Emergency Management Agency.

I would like to address a few questions to FEMA's Director, General Becton. I must admit my experiences with FEMA over the past year have left me with mixed feelings. On one hand, I think that the people of Long Island would agree that FEMA's assistance was tremendously valuable in the wake of Hurricane Gloria. Also, FEMA is currently involved in relief for homeowners at Hoover Beach on Lake Erie, and I know that the residents of that area are appreciative of these efforts.

However, it is no secret that I have disagreed with FEMA on the issue of emergency evacuation plans for Shoreham nuclear plant on Long Island. On February 13, 1986, FEMA ran a test of the Long Island Lighting Co.'s evacuation plan for Shoreham. This was done over the objections of the local government and without the cooperation of police, firefighters, hospitals, and other local officials.

This was, in my mind, a travesty. How can we expect the local citizens to have confidence in a plan which was tested over their objections?

General Becton, I do not want to spend a lot of time this morning getting into discussions over the merits of nuclear power, or whether the NRC is exercising proper oversight when licensing plants, but I do want to discuss specifically this February 13 sham exercise.

The Director of FEMA's regional office in New York, Frank Petrone, is on record as saying that FEMA cannot make a reasonable assurance of safety to the NRC based on the February 13 exercise. I certainly agree with this statement.

I want to remind the members of this subcommittee of my objections last November when report language suggesting that FEMA run this drill was included in the fiscal year 1986 appropriation report. I am still opposed to this type of imposition over local government's rights.

General Becton, I do not believe that this drill will ensure the safety of those who live in the vicinity of the plant, and I do not believe that this exercise is adequate for licensing.

Thank you, Mr. Chairman.

REQUEST TO OMB

Senator GARN. Thank you, General Becton.

Is the amount requested in your budget justification different from the requests you made to OMB?

General BECTON. It is different; yes, sir.

Senator GARN. Could you indicate to the subcommittee those major program areas that were increased and those that were reduced in relationship to your request to OMB and what ultimately is the request of the administration?

General BECTON. I would ask my Comptroller to provide that information, sir, or we can do it for the record, whichever is more convenient from the standpoint of timing.

Senator GARN. That would be fine. You can do it for the record.

General BECTON. All right, sir.

Senator GARN. If you could give us the complete documentation beyond the major areas I was asking about and detail the differences?

General BECTON. We will do that.

Senator GARN. If you could also, in that, give us an explanation of what changes are going to do, rather than just the raw figures; what is your estimation of what it will do to your programs compared to your request and what you intended to do and what you will be able to do under the President's budget.

General BECTON. We can provide to the committee, as we discussed with Mr. Reiss the priorities that we established; where the line was drawn, and what fell out.

Senator GARN. Thank you.

[The information follows:]

REQUEST TO OMB

The attached table compares the Federal Emergency Management Agency's (FEMA's) FY 1987 request to Congress with FEMA's FY 1987 request to OMB.

In preparing its request to OMB for FY 1987 in August, 1985, FEMA looked at the priorities within the agency. Faced with the growing budget deficit and the passage of the Balanced Budget and Emergency Deficit Control Act of 1985 (P.L. 99-177), OMB substantially reduced FEMA's request as well as that of other Federal agencies. Narrative details concerning the difference between FEMA's FY 1987 request to OMB and the FY 1987 request to Congress follow.

Civil Defense.

The FY 1987 request to OMB included funding for the 1981 level of funding ($120 million) plus inflation. Grants to the States were 100% funded. The request to Congress also includes 100% funding for Civil Defense grants to the States, but at a reduced level which is comparable to the FY 1986 level as reduced by the Balanced Budget and Emergency Deficit Control Act of 1985.

In addition to a reduced level for grants to the States for field training, the Training and Education program request to Congress differs from the request to OMB in that the request to OMB contained funds for NETC West, student travel costs, and student lodging costs.

The request to OMB for Telecommunications and Warning contained $2.2 million for the FEMA Switch Network (FSN), $1.07 million for the FEMA National Radio System (FNARS), and $230 thousand for the National Warning System centers upgrade. Under the request to Congress, FEMA will reduce the levels of acquisition for the FSN and will eliminate the FNARS upgrade effort.

In order to meet general reductions in the FY 1986 appropriation, FEMA eliminated one mainframe computer at Olney, Maryland. This reduction became part of the FY 1987 request to Congress even though it was not part of the request to OMB.

Comprehensive Emergency Preparedness Planning.

General reductions which were taken in accordance with the FY 1986 appropriation carried forward into the FY 1987 request to Congress.

Radiological Emergency Preparedness.

While there is no difference in program funds between the requests to OMB and Congress, there is a reduction in workyears and salaries and expenses. These salaries and expenses funds were requested to adequately fund workyears contained in the FY 1986 request to Congress.

Federal Preparedness.

As a result of general reductions in the FY 1986 appropriation, FEMA decided to operate the Emergency Information and Coordination Center (EICC) on a 40-hour per week basis, rather than a 24-hour per day basis. The request to Congress for FY 1987 continues this reduced schedule of operation. The reduced schedule will cause some delay in responding to emergencies which happen after the shortened hours, degradation of the agency's communications capabilities with resultant longer delivery times, and elimination of the EICC's computer-driven decision support assets.

The National Defense Executive Reserve (NDER) program funds were eliminated in order to meet general reductions in FY 1986. These funds are not reinstated in the 1987 request to Congress.

A request to OMB for an industrial emergency preparedness initiative was eliminated in the FY 1987 request to Congress.

Training and Fire Programs.

Reductions from the FY 1987 request to OMB included elimination of funding for the U.S. Fire Administration, elimination of funding for NETC West, and funding of student travel and lodging costs by students or student-sponsors.

Flood Plain Management/National Flood Insurance Fund.

FEMA's OMB request for the National Flood Insurance Fund (NFIF) proposed a 10% rate increase for policy holders and did not include Flood Plain Management activities for which an appropriation of $53,287,000 was requested. Total workyears requested for Insurance Activities and Flood Plain Management were equivalent to the FY 1986 level of 225. The request to Congress placed all Flood Plain Management activities and Salaries and Expenses under the National Flood Insurance Fund, reduced total workyears for Insurance Activities and Flood Plain Management to 203, and proposed to make the NFIF self-supporting by FY 1987, instead of the previous goal of FY 1988. This would be accomplished by a combination of rate and other changes equivalent to a 27% increase in premiums.

Management and Administration.

OMB reduced FEMA's FY 1987 base to the FY 1986 appropriation level which included a sizeable reduction to Automatic Data Processing as a result of eliminating a mainframe at Olney, Maryland. This elimination will result in a slightly reduced level of support for such programs as Disaster Assistance and the NETC registration and admissions systems. While the request to OMB includes some increases for inflationary costs, the request to Congress included higher estimates for uncontrollable increases. The request to OMB also included some management improvement items as well as an increase for information systems.

FEDERAL EMERGENCY MANAGEMENT AGENCY
Appropriation History by Program
(Dollars in Thousands)

	1986 Current Estimate				1987 Request to OMB				1987 Request to Congress				Increase/Decrease			
	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL
Civil Defense																
A. State and Local Emergency Management																
1. Emergency Management Assistance..	189	$11,324	$54,549	$65,873	183	$12,870	$60,000	$72,870	169	$11,011	$54,123	$65,134	(14)	($1,859)	($5,877)	($7,736)
2. Other S&L Emergency Mgmt.........	16	896	718	1,614	16	966	2,000	2,966	16	1,089	712	1,801	0	123	(1,288)	(1,165)
Subtotal, S&L Emerg. Mgmt........	205	12,220	55,267	67,487	199	13,836	62,000	75,836	185	12,100	54,835	66,935	(14)	(1,736)	(7,165)	(8,901)
B. Radiological Defense																
1. Planning & Development...........	5	288	2,463	2,751	4	302	3,000	3,302	5	251	2,445	2,696	1	(51)	(555)	(606)
2. Instrumentation...................	19	847	6,836	7,683	19	891	8,000	8,891	18	889	6,780	7,669	(1)	(2)	(1,220)	(1,222)
3. Other Radiological Defense.......	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal, Radiological Defense...	24	1,135	9,299	10,434	23	1,193	11,000	12,193	23	1,140	9,225	10,365	0	(53)	(1,775)	(1,828)
C. Population Protection																
1. Population Protection Planning...	40	1,465	8,039	9,504	37	1,540	7,955	9,495	53	2,531	7,975	10,506	16	991	20	1,011
2. Facility Survey, Eng. & Dev......	29	1,779	3,445	5,224	39	1,885	2,445	4,330	40	1,909	3,418	5,327	1	24	973	997
3. Shelter Preparation..............	2	63	0	63	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal, Population Protection..	71	3,307	11,484	14,791	76	3,425	10,400	13,825	93	4,440	11,393	15,833	17	1,015	993	2,008
D. Protection of Industrial Capability																
1. Industrial Capability Prot. Plng.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Keyworker Protection.............	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Other PIC.........................	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal, PIC....................	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. S & L Direction, Control and Warning																
1. Emergency Operating Centers......	13	676	0	676	14	723	8,700	9,423	13	683	70	753	(1)	(40)	(8,630)	(8,670)
2. State & Local Wrng. & Com. Sys...	10	541	0	541	11	568	1,000	1,568	10	540	70	610	(1)	(28)	(930)	(958)
3. Emrg. Broadcast Sys. Guid. & Asst	10	491	0	491	10	516	2,000	2,516	10	489	30	519	0	(27)	(1,970)	(1,997)
4. Other S&L Direct., Control & Wrng	5	246	539	785	7	325	900	1,225	6	258	365	623	(1)	(67)	(535)	(602)
Subtotal, S&L Dir., Cntrl. & Wrng	38	1,954	539	2,493	42	2,132	12,600	14,732	39	1,970	535	2,506	(3)	(162)	(12,065)	(12,227)

FEDERAL EMERGENCY MANAGEMENT AGENCY
Appropriation History by Program
(Dollars in Thousands)

	1986 Current Estimate				1987 Request to OMB				1987 Request to Congress				Increase/Decrease			
	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL
F. Research																
1. Research	0	$122	$0	$122	0	$0	$0	$0	0	$0	$0	$0	0	$0	$0	$0
2. Systems Integ. & Applications	0	0	0	0	0	0	120	120	0	0	0	0	0	0	(120)	(120)
3. Systems Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Policy and Planning	10	434	96	530	12	667	380	1,047	9	485	100	585	(3)	(182)	(280)	(462)
Subtotal, Research	10	556	96	652	12	667	500	1,167	9	485	100	585	(3)	(182)	(400)	(582)
G. Training and Education																
1. Instructional Progs. & Materials	5	201	539	740	5	233	600	833	5	211	527	738	0	(22)	(73)	(95)
2. Training Field Deployment Systems	18	800	5,704	6,504	17	827	7,049	7,876	17	840	5,704	6,544	0	13	(1,345)	(1,332)
3. Resident Programs	23	946	2,143	3,089	23	1,122	2,851	3,973	23	994	1,143	2,137	0	(128)	(1,708)	(1,836)
4. NETC Site Administration	9	383	2,168	2,551	24	959	3,118	4,077	19	489	1,760	2,249	(5)	(470)	(1,358)	(1,828)
5. NETC West Site Administration	1	79	383	462	5	209	882	1,091	0	0	0	0	(5)	(209)	(882)	(1,091)
6. Emergency Public Information	0	0	10	10	0	0	500	500	0	0	0	0	0	0	(500)	(500)
Subtotal, Training & Education	56	2,409	10,947	13,356	74	3,350	15,000	18,350	64	2,534	9,134	11,668	(10)	(816)	(5,866)	(6,682)
H. Telecommunications and Warning																
1. National Warning System	24	1,010	5,224	6,234	32	1,441	5,904	7,345	27	1,063	5,183	6,246	(5)	(378)	(721)	(1,099)
2. Washington Area Warning System	2	80	555	635	2	91	1,085	1,176	2	85	551	636	0	(6)	(534)	(540)
3. FEMA National Teletype System	13	430	1,457	1,887	21	624	1,452	2,076	13	452	1,445	1,897	(8)	(172)	(7)	(179)
4. FEMA National Voice System	3	87	954	1,041	5	102	497	599	3	92	946	1,038	(2)	(10)	449	439
5. FEMA National Radio System	25	911	2,903	3,814	37	1,258	1,785	3,043	25	958	32	990	(12)	(300)	(1,753)	(2,053)
6. Telecommunications Sup. Services	9	333	3,399	3,732	14	463	2,592	3,055	9	350	3,372	3,722	(5)	(113)	780	667
7. U.S. Army Civil Prepdns. Detach.	5	183	1,053	1,236	9	242	1,100	1,342	5	192	1,045	1,237	(4)	(50)	(55)	(105)
8. Decision Info. Dist. System	1	35	482	517	1	40	660	700	1	38	478	516	0	(2)	(182)	(184)
9. DOD Reimbursable Support	0	0	650	650	0	0	825	825	0	0	645	645	0	0	(180)	(180)
Subtotal, Tele. & Warning	82	3,069	16,677	19,746	121	4,261	15,900	20,161	85	3,230	13,697	16,927	(36)	(1,031)	(2,203)	(3,234)
I. Automatic Data Processing (S&E)	14	1,856	0	1,856	20	2,396	0	2,396	10	1,747	0	1,747	(10)	(649)	0	(649)
Subtotal, Civil Defense	500	26,506	104,309	130,815	567	31,260	127,400	158,660	508	27,646	98,919	126,565	(59)	(3,614)	(28,481)	(32,095)

FEDERAL EMERGENCY MANAGEMENT AGENCY
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(Dollars in Thousands)

	1986 Current Estimate				1987 Request to OMB				1987 Request to Congress				Increase/Decrease			
	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL
Comp. Emerg. Preparedness Planning																
A. Disaster Prep. Improvement Grants...	1	$38	$0	$38	3	$121	$0	$121	1	$41	$0	$41	(2)	(80)	$0	(80)
B. Earthquake..........................	18	1,096	4,283	5,379	27	1,542	4,696	6,238	23	1,153	4,475	5,628	(4)	(389)	(221)	(610)
C. Hurricane...........................	5	253	858	1,111	9	416	896	1,312	6	266	896	1,162	(3)	(150)	0	(150)
D. Hazardous Materials.................	6	344	191	535	15	826	250	1,076	7	361	200	561	(8)	(465)	(50)	(515)
E. Dam Safety..........................	2	110	413	523	3	116	482	598	3	116	432	548	0	0	(50)	(50)
F. Hazard Mitigation Assistance........	4	215	191	406	6	266	250	516	5	226	200	426	(1)	(40)	(50)	(90)
G. Policy and Planning.................	15	635	0	635	18	804	0	804	16	669	0	669	(2)	(135)	0	(135)
Subtotal, CEPP.........................	51	2,691	5,936	8,627	81	4,091	6,574	10,665	61	2,832	6,203	9,035	(20)	(1,259)	(371)	(1,630)
Radiological Emergency Preparedness																
A. Fixed Nuclear Facilities............	62	2,771	3,427	6,198	64	3,086	3,581	6,667	60	2,919	3,581	6,500	(4)	(167)	0	(167)
Subtotal, REP..........................	62	2,771	3,427	6,198	64	3,086	3,581	6,667	60	2,919	3,581	6,500	(4)	(167)	0	(167)
Federal Preparedness																
A. Government Preparedness																
1. Government Preparedness..........	797	33,834	102,923	136,757	991	53,812	203,125	256,937	825	39,226	130,070	169,296	(166)	(14,586)	(73,055)	(87,641)
Subtotal, Govt. Preparedness.....	797	33,834	102,923	136,757	991	53,812	203,125	256,937	825	39,226	130,070	169,296	(166)	(14,586)	(73,055)	(87,641)
B. Emerg. Info. & Coordination Center																
1. EICC............................	9	329	478	807	18	768	500	1,268	8	347	500	847	(10)	(421)	0	(421)
Subtotal, EICC..................	9	329	478	807	18	768	500	1,268	8	347	500	847	(10)	(421)	0	(421)
C. Resources Preparedness																
1. Resources Assessment.............	6	234	469	703	7	448	1,487	1,935	7	328	621	949	0	(120)	(866)	(986)
2. Other Resources Planning.........	9	502	780	1,282	5	318	415	733	5	467	780	1,247	0	149	365	514
3. Economic Resources Planning......	2	153	335	488	0	0	0	0	0	70	0	70	0	70	0	70
4. Natural Resources Planning.......	7	514	239	753	7	447	250	697	2	408	239	647	(5)	(39)	(11)	(50)
5. Resources Prep. Prog. Integrat...	3	156	186	342	3	216	194	410	3	165	186	351	0	(51)	(8)	(59)
Subtotal, Resources Preparedness.	27	1,559	2,009	3,568	22	1,429	2,346	3,775	17	1,438	1,826	3,264	(5)	9	(520)	(511)

FEDERAL EMERGENCY MANAGEMENT AGENCY
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	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL
D. Mobilization Preparedness																
1. Mobilization Planning............	12	$580	$287	$867	13	$657	$300	$957	11	$640	$300	$940	(2)	($17)	$0	($17)
2. Mobilization Exercises...........	13	625	669	1,294	14	736	699	1,435	13	677	699	1,376	(1)	(59)	0	(59)
3. Security Planning................	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. National Def. Executive Reserve..	1	97	0	97	4	192	227	419	1	52	0	52	(3)	(140)	(227)	(367)
5. Program Integration..............	3	203	0	203	3	170	0	170	3	214	0	214	0	44	0	44
Subtotal, Mobilization Prep......	29	1,505	956	2,461	34	1,755	1,226	2,981	28	1,583	999	2,582	(6)	(172)	(227)	(399)
E. Federal Preparedness Policy & Plng																
1. Multiprogram Analysis............	2	103	192	295	2	109	200	309	2	109	200	309	0	0	0	0
2. Policy & Planning................	17	983	554	1,537	26	1,375	3,579	4,954	17	1,034	579	1,613	(9)	(341)	(3,000)	(3,341)
Subtotal, Fed. Prep. Pol. & Plng.	19	1,086	746	1,832	28	1,484	3,779	5,263	19	1,143	779	1,922	(9)	(341)	(3,000)	(3,341)
Subtotal, Federal Preparedness......	881	38,313	107,112	145,425	1,093	59,248	210,976	270,224	897	43,737	134,174	177,911	(196)	(15,511)	(76,802)	(92,313)
Training and Fire Programs																
A. Emergency Management Institute																
1. Instructional Progs. & Materials.	0	0	1,185	1,185	0	0	1,168	1,168	0	0	1,238	1,238	0	0	70	70
2. Training Field Deployment Systems	0	0	747	747	0	0	831	831	0	0	681	681	0	0	(150)	(150)
3. Resident Programs................	6	229	827	1,056	6	253	1,242	1,495	6	240	714	954	0	(13)	(528)	(541)
4. NETC Site Administration.........	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. NETC West Site Administration....	0	0	364	364	0	0	380	380	0	0	0	0	0	0	(380)	(380)
Subtotal, EMI....................	6	229	3,123	3,352	6	253	3,621	3,874	6	240	2,633	2,873	0	(13)	(988)	(1,001)
B. National Fire Academy																
1. Instructional Progs. & Materials.	5	248	778	1,026	3	164	867	1,031	5	260	813	1,073	2	96	(54)	42
2. Training Field Deployment Systems	9	500	1,629	2,129	14	763	1,842	2,605	10	527	1,702	2,229	(4)	(236)	(140)	(376)
3. Resident Programs................	21	1,114	1,640	2,754	22	1,207	2,256	3,463	23	1,171	464	1,635	1	(36)	(1,792)	(1,828)
4. NETC Site Administration.........	25	1,747	2,743	4,490	34	2,043	2,866	4,909	40	1,850	2,254	4,104	6	(193)	(612)	(805)
5. NETC West Site Administration....	0	0	1,292	1,292	5	196	1,500	1,696	0	0	0	0	(5)	(196)	(1,500)	(1,696)
Subtotal, NFA....................	60	3,609	8,082	11,691	78	4,373	9,331	13,704	78	3,808	5,233	9,041	0	(565)	(4,098)	(4,663)

FEDERAL EMERGENCY MANAGEMENT AGENCY
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C. U.S. Fire Administration																
1. Fire Prevention and Arson Control	4	$182	$3,338	$3,520	5	$247	$3,649	$3,896	0	$0	$0	$0	(5)	($247)	($3,649)	($3,896)
2. Fed. Fire Policy & Coordination..	7	468	914	1,382	5	277	999	1,276	0	0	0	0	(5)	(277)	(999)	(1,276)
3. Firefighter Health and Safety....	5	226	914	1,140	5	247	999	1,246	0	0	0	0	(5)	(247)	(999)	(1,246)
4. Fire Data and Analysis...........	6	271	1,051	1,322	5	249	1,150	1,399	0	0	0	0	(5)	(249)	(1,150)	(1,399)
Subtotal, USFA....................	22	1,147	6,217	7,364	20	1,020	6,797	7,817	0	0	0	0	(20)	(1,020)	(6,797)	(7,817)
Subtotal, Training & Fire Programs..	88	4,985	17,422	22,407	104	5,646	19,749	25,395	84	4,048	7,866	11,914	(20)	(1,598)	(11,883)	(13,481)
Flood Plain Management																
A. Flood Studies and Surveys...........	70	3,050	34,927	37,977	87	4,060	36,902	40,962	0	0	0	0	(87)	(4,060)	(36,902)	(40,962)
B. Flood Hazard Reduction..............	67	2,608	3,852	6,460	81	3,303	4,070	7,373	0	0	0	0	(81)	(3,303)	(4,070)	(7,373)
C. Purchase of Property................	3	126	4,523	4,649	4	174	4,778	4,952	0	0	0	0	(4)	(174)	(4,778)	(4,952)
D. State Assistance Program............	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal, Flood Plain Management....	140	5,784	43,302	49,086	172	7,537	45,750	53,287	0	0	0	0	(172)	(7,537)	(45,750)	(53,287)
Disaster Relief Administration (S&E)...	145	6,260	0	6,260	144	6,678	0	6,678	144	6,587	0	6,587	0	(91)	0	(91)
Insurance Activities (S&E).............	52	2,507	0	2,507	53	2,849	0	2,849	0	0	0	0	(53)	(2,849)	0	(2,849)
Emergency Food & Shelter (S&E).........	4	211	0	211	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL, EMERG. PLNG. ASSIST. & SUP....	1,923	90,028	281,508	371,536	2,278	120,395	414,030	534,425	1,754	87,769	250,743	338,512	(524)	(32,626)	(163,287)	(195,913)
Management and Administration..........	375	28,076	0	28,076	432	43,689	0	43,689	354	30,738	0	30,738	(78)	(12,951)	0	(12,951)
TOTAL, FEMA OPERATING PROGRAMS AND MANAGEMENT & ADMINISTRATION....	2,298	118,104	281,508	399,612	2,710	164,084	414,030	578,114	2,106	118,507	250,743	369,250	(602)	(45,577)	(163,287)	(208,864)

FEDERAL EMERGENCY MANAGEMENT AGENCY
Appropriation History by Program
(Dollars in Thousands)

	1986 Current Estimate				1987 Request to OMB				1987 Request to Congress				Increase/Decrease			
	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL	WY	S&E	EMPA	TOTAL
Management and Administration																
A. Office of the Director	10	$470	$0	$470	9	$484	$0	$484	8	$495	$0	$495	(1)	$11	$0	$11
B. General Counsel	20	1,017	0	1,017	22	1,099	0	1,099	19	1,069	0	1,069	(3)	(30)	0	(30)
C. Inspector General	39	1,972	0	1,972	39	2,059	0	2,059	42	2,075	0	2,075	3	16	0	16
D. Special Programs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. Executive Administration																
1. Exec. Administrator's Office	4	243	0	243	4	205	0	205	4	256	0	256	0	51	0	51
2. Public Affairs	11	661	0	661	15	889	0	889	9	645	0	645	(6)	(244)	0	(244)
3. Congressional Relations	6	297	0	297	6	322	0	322	6	302	0	302	0	(20)	0	(20)
4. International Affairs	5	360	0	360	7	411	0	411	4	322	0	322	(3)	(89)	0	(89)
5. Equal Opportunity	4	232	0	232	5	274	0	274	3	182	0	182	(2)	(92)	0	(92)
6. Security	13	688	0	688	13	749	0	749	12	726	0	726	(1)	(23)	0	(23)
F. Acquisition Management	32	1,241	0	1,241	41	1,875	0	1,875	32	1,307	0	1,307	(9)	(568)	0	(568)
G. Personnel	44	2,110	0	2,110	45	2,790	0	2,790	43	2,223	0	2,223	(2)	(567)	0	(567)
H. Comptroller	75	3,419	0	3,419	78	4,550	0	4,550	76	3,607	0	3,607	(2)	(943)	0	(943)
I. Prog. Analysis & Evaluation	9	395	0	395	13	942	0	942	8	416	0	416	(5)	(526)	0	(526)
J. Administrative Support Staff	61	1,905	0	1,905	62	2,082	0	2,082	61	2,004	0	2,004	(1)	(78)	0	(78)
K. Other Admin. Expenses	0	8,140	0	8,140	0	13,346	0	13,346	0	10,351	0	10,351	0	(2,995)	0	(2,995)
L. Automatic Data Processing																
1. ADP Support	34	1,928	0	1,928	65	6,173	0	6,173	20	1,073	0	1,073	(45)	(5,100)	0	(5,100)
2. Administrative Telephones	0	2,021	0	2,021	0	4,412	0	4,412	0	2,650	0	2,650	0	(1,762)	0	(1,762)
3. Word Processing	0	672	0	672	0	702	0	702	0	714	0	714	0	12	0	12
M. Regional Operations	8	305	0	305	8	325	0	325	7	321	0	321	(1)	(4)	0	(4)
Subtotal, Management & Admin.	375	28,076	0	28,076	432	43,689	0	43,689	354	30,738	0	30,738	(78)	(12,951)	0	(12,951)

REPROGRAMMING

Senator GARN. There have been instances in the past with FEMA—and not on your watch, but where the Agency has reprogrammed funds without asking permission of the committee to do so. So I hope that you and your staff are well aware of the requirements to inform the committee, and in some of the areas where we have had difficulty, make certain that you are aware that you are going to inform the committee when: The reprogramming does not change the amount in an account, but there is significant departure from the budget plans submitted to the committee in the budget justification; reprogramming of funds in excess of $250,000 between programs, activities, or elements; and three, lesser amounts of funding if such reprogramming actions would have the effect of changing the funding requirements in future years; and four, if programs or projects specifically cited in the committee reports are affected.

[CLERK'S NOTE: The committee requires notification of reprogramming of FEMA funds in excess of $250,000 while the approval of the committee is required when this figure exceeds $500,000 at FEMA.]

Senator GARN. I think it is important, not that we are trying to be policemen up here, but certainly, it makes for a much smoother operation, and in my experience, Senator Leahy and I don't often turn down reprogramming requests. We usually trust the agencies under our jurisdiction, and occasionally, we have a difference of opinion, but not too often. So it isn't a matter of we are going to sit here and try and micromanage and try and judge everything you do and second guess you, but it is important when we are approving your budgets that we know during the year what changes you think are necessary and consult with us on that.

So I hope we will have that cooperation from you.

General BECTON. Mr. Chairman, I can assure you that we will provide all that information. As I indicated in my brief statement, the first one we are obviously looking at is the requirement to reprogram from the NETC West program elements. I can assure you that we will continue to work with your subcommittee and staff.

Senator GARN. Better let Senator Laxalt know about that. [Laughter.]

General BECTON. Sir, we have discussed that with Senator Laxalt, too.

TELECOMMUNICATIONS AND WARNING

Senator GARN. At the fiscal year 1986 budget hearing before this subcommittee, FEMA provided a priority ranking of the nine activities within telecommunications and warning. We are, frankly, a little bit puzzled about the current fiscal year 1986 budget. Your top-ranked telecommunications and warning activity was reduced by almost $1 million. The next ranked activity was increased by slightly over $1 million. The fourth ranked activity was kept level; the fifth ranked activity was decreased. All in all, telecommunications and warning was increased less than $800,000 over the fiscal year 1986 budget request.

This was after some specific encouragement in the Senate report, the House-Senate conference report, and a joint letter on the revised fiscal year 1985 budget estimates from the House and Senate Appropriations subcommittees. The point is, the Agency has obviously changed its thinking since FEMA last testified, and again, that was not you, General Becton. In trying to establish priorities, we are attempting to be helpful by saying, what are your priorities? We have got limited budgets, and give us your priorities.

So we are given a list of priorities, and then we find out that during the year the Agency has changed these without telling us. Could you describe for us your prioritized ranking of the nine telecommunications and warning projects for 1987?

General BECTON. Sir, I would like to turn that, in a minute, over to the Associate Director directly concerned, but I would like to make a comment. While the earlier decision was not on my watch, I accept the full responsibility for the priorities that were established in the Agency for fiscal year 1986 and into the future.

As we took a look at what we are faced with, again, we went back to our requirements: What are we mandated to do? My first priority is the protection of the country, the people, and the continuity of the Government; and my second priority is for the Agency so we can be staffed to do that job and all the other jobs.

As we went down that list of mandated things, we were forced to make some very, very tough decisions. Part of those decisions are reflected in just what you finished reading. I would like to ask Bill Williams if he would comment on the nine items and how we did it for telecommunications.

PRIORITY LISTING

Senator GARN. Why don't you do this, if you could: Provide by April 15 a prioritized list for the subcommittee, if you could do it in more detail of all the EMPA activities of FEMA.

General BECTON. Thank you, sir.

Senator GARN. Let me just say again that all we are attempting to do there is not for us to prioritize, but to say, "What are your priorities?"

General BECTON. I understand. I appreciate it.

Senator GARN. Whether it is your Agency or others, when we give them the opportunity to say, what do you want to do and then it is all changed, you start to have questions about who knows what is going on, and I have been trying for years with, as an example, with the VA, "Give me a simple list of what your priorities are to build Veterans Administration hospital facilities" and trying to get the the politics out of it and saying, "OK, where does the veterans population live? What is the age of the veterans population, and where do you need facilities?" Because in some locations they can't fill up the hospital beds and others they are standing in line to get in.

Then when I get a priority list back that a parking lot in San Francisco is No. 1 on a priority list compared to taking care of patients, well, that rings a little bell with me. "Gee, it is really important to take care of those cars compared to veterans."

So again, the point is, with your Agency, or any others, you people who are professionals are working in it; tell us what your priorities are. That becomes even more important than when I first started this campaign, because the budget dollars are a lot tighter.

General BECTON. I agree 100 percent.

Senator GARN. You are the only ones who can recommend to us. I can't judge what your priorities should be. I don't think about FEMA every day, all day. [Laughter.]

I really don't. But you do. [Laughter.]

General BECTON. I am trying to help you to appreciate that, sir. [Laughter.]

Senator GARN. Other than the fact that there are 17 other agencies under this subcommittee and I have to chair the Senate Banking Committee and serve on four other appropriations subcommittees of this Appropriations Committee, no matter how much you try, I am not going to think about FEMA all day long. [Laughter.]

General BECTON. Thank you, sir. [Laughter.]

USE OF CIVIL DEFENSE FUNDS

Senator GARN. On Tuesday, February 25, I met with members of the National Coordinating Council on Emergency Management. They were concerned after meeting with you. Their impression was that they, if they did not emphasize and make attack-related preparedness the cornerstone of their program, which includes peacetime preparedness, they might lose all the funds provided through the Emergency Management Assistance Program of the civil defense activity.

I have certainly spoken to enough groups over the years to know they sometimes jump to conclusions of what speakers are trying to tell them. So for this reason, I was not entirely surprised to read on page 3 of your opening statement:

> Civil defense funds made available to States for attack preparedness may be used for preparing for and providing emergency assistance in response to peacetime disasters to the extent such use is consistent with, contributes to and does not detract from attack-related preparedness.

Could you elaborate for us on that portion of your written statement and address the concern that the local emergency management personnel have and that they think there aren't going to be any funds for non-attack preparedness activities?

General BECTON. Yes, sir.

Apparently, I was not very clear when I discussed it with them. We are talking about an across-the-board preparedness for all hazards, natural disaster to the catastrophic; that is, nuclear attack if it was to occur. It is our position that the funds provided should be used in preparation to protect the population against all hazards, and we would hope that the State and local governments would be able to do that.

What we said, in effect, is that if, because of whatever their views may be, a decision is made not to protect the population against all hazards, then we would consider reallocating the funds to those State and local governments that are doing that type of preparedness planning.

Bernie, would you care to make any further comments?

Mr. MAGUIRE. None, other than to clarify the Director's opening statement: The language parallels the 1981 amendments to the Civil Defense Act, which states that all funds used under the Civil Defense Program are to contribute to, not to detract from attack preparedness.

Senator GARN. I would apologize for possibly being unclear as to your statement. In my 19 years of public office, there are a couple of times I have been misunderstood. [Laughter.]

General BECTON. Yes, sir.

DISASTER RELIEF SUPPLEMENTAL

Senator GARN. In fiscal year 1986, FEMA requested $194 million for the President's Disaster Relief Fund. The subcommittee, recognizing that the annual obligation over a 10-year period has averaged $300 million, and also recognizing that there would be an unobligated balance of over $260 million at the end of fiscal year 1985, provided $100 million in the fiscal year 1986 appropriations bill.

We are now anticipating action on a $250 million supplemental request for the fiscal year 1986 Disaster Relief Fund.

What, exactly, is your present situation as far as the remaining funds in this account, and what will happen when you run out?

General BECTON. Mr. Chairman, I would like for Dr. Speck to respond to that. I would point out one thing, if I could, before he does.

My previous job was the Director of the Office of Foreign Disaster Assistance, AID, in which we provided, as you know, disaster assistance to foreign countries. My budget was $25 million, and we were consistently unable to predict how much money we would spend because we did not know what type of acts of God would take place.

Last year, we went from $25 million to in excess of $150 million through the courtesy of the Senate because of our inability to predict. We are also faced with that same type of situation to, with any degree of finesse, to make those predictions.

I will let Sam bail me out, then.

Mr. SPECK. Thank you, Mr. Director. Thank you, Mr. Chairman.

If we look at how we came into fiscal year 1986, we had a carryover of $268 million. We then had a fiscal year 1986 appropriation of $96 million as reduced by Gramm-Rudman-Hollings, and we are looking at an estimated recovery of about $50 million, which provides us with $414 million before fiscal year 1986.

As we came into fiscal year 1986, our obligations were estimated at $58 million. Our estimated new obligations as a result of an almost unprecedented series of disasters of significant magnitude since the beginning of this fiscal year adds an additional $464 million. Let me say that includes an estimated $65 million for the disaster in California.

That, admittedly, has to be a fairly rough figure at this point. It also includes an estimated $10 million for the disasters that have been recently declared in Nevada and Washington.

It is still anticipated, if you pro rate the amount that we might expect to have obligated from disasters yet to occur for the remainder of the fiscal year, that we will be looking at an obligation of an additional $146 million.

That is based upon a pro ration of the average of something in the neighborhood of $250 million in obligations over the past 5 years. That gives us an obligation of about $668 million for fiscal year 1986.

If you deduct the moneys we brought in, the appropriation and the estimated recovery, that gives us a projected deficit of $254 million, which is a little higher figure than I think you were originally provided before the advent of the major disaster in California. The supplemental calls for $250 million, and that would bring us within about $4 million of what we estimate our projected deficit to be, updated to include the California disaster.

That essentially is the situation, Mr. Chairman, insofar as fiscal year 1986 is concerned and the request for the $250 million supplemental for the President's Disaster Fund.

DISASTER RELIEF REQUEST FOR FISCAL YEAR 1987

Senator GARN. Let me say that I fully understand that there is no way you or anybody else can predict how many hurricanes are going to occur or storms in California, so you have virtually an impossible task to predict. But nevertheless, when you request only $100 million, I wonder how you justify that when you had an average of $300 million a year, and we know we get into the supplemental game. Why aren't we more honest about it up front?

Even though I recognize there is no way you can anticipate what is going on, it would seem to me that $100 million in the 5 years I have been chairman of this subcommittee is inadequate and we will have to come back with a supplemental.

Mr. SPECK. Mr. Chairman, if I may respond, for fiscal year 1986 you will recall we received an appropriation of $96 million, as reduced by Gramm-Rudman-Hollings, because we anticipated a substantial carryover of some $268 million, as it ultimately turned out. Over the past decade, the appropriation amount requested has varied considerably. There were a number of years, if you will check over the past decade, in which we asked for essentially the same amount, $100 million, when it looked as if we were going to have a substantial carryover from the previous year.

If you look at what we are proposing for fiscal year 1987, admittedly, it is a very tight budget. Here again, we are asking for a $100 million appropriation. We expect recoveries of about $50 million, as well as to reduce our obligations from an average of about $240 million over the past 5 years to about $140 million. These reductions will be accomplished through a series of modifications in the rules and in the statute, including the introduction of some cost savings and some cost sharing with the State and local governments.

It is on the basis of projected cuts in spending, as a result particularly of greater cost sharing with the State and local governments, that we anticipate, if we have an average year, to be able to operate with a balanced budget within that request.

COST SHARING WITH STATES

Senator GARN. You brought up the matter of cost sharing with the States. Depending on how you want to implement it, this really reflects the same problem we had with FEMA civil defense grants in fiscal year 1986, going from 100 percent Federal funding to 50–50 State-Federal.

It can't really be done in a single year. Wouldn't it make more sense to phase it in over a period of years? We are putting a lot of problems on State and local government, not only in this area, but in others, by trying to do it precipitously. I don't necessarily have any objection to the transition. It is just, how fast can they adjust to it?

General BECTON. We appreciate, sir, the difficulty that some States would have, because in some cases, their legislatures only meet once every 2 years.

Senator GARN. Those are the lucky States. [Laughter.]

Just think how well off the country would be if we only met every other year. [Laughter.]

General BECTON. Sir, I heard you mention something about artificial intelligence. I don't intend to——

Senator GARN. There is one other fact you ought to consider. Nobody, including the press, should ever criticize junkets. Can you imagine if we kept the entire Congress traveling all the time in the most luxurious hotels in the best countries in the world the billions of dollars we would have saved by now? [Laughter.]

General BECTON. I was reflecting on my earlier reincarnation of wearing a uniform, and I don't think I want to answer that question. [Laughter.]

But from a disaster assistance standpoint, we will try to go from 100 percent to 75–25 or 50–50. We believe that the cost sharing, in looking at the details, address a sliding scale, which we think would be far more palatable to the State and local governments once they have had a chance to look at it.

We have discussed it with the State directors and other interested groups, and I think that once they have a thorough understanding of it, it will become easier to deal with.

Mr. Speck?

Mr. SPECK. I think, Director, and Senator, that that is right on target. When we talk about going to 50–50, we are not talking about a 50–50 cost share on public assistance projects. What we are talking about is going from what equates to a 75–25 overall cost share in declared disasters to a 50–50 overall cost share.

But that overall cost share is not just a semantical trick. What it really means is that through a threshold, if you like, in which the States would be required to pick up the first dollar and the local governments the first $2.50—that is, take care of those smaller disasters themselves—we would still be doing a cost share at 75–25 on those disasters that were of the larger magnitude. Indeed, we would go to a 90–10 share on the larger disasters, similar to the one you had in Utah a few years ago, which would actually be an even greater Federal share of the cost.

The Utah disaster would have qualified, under our proposal, for a 90–10 share as opposed to a 75–25 share, just as the West Virginia disaster would under this arrangement; just as the Puerto Rican disasters would under this arrangement.

So we are trying to, say, on the one hand, to the State and local governments: In an effort to balance the budget, pick up those smaller, lower cost disasters. We believe this reflects what the law says that a disaster should, indeed, be beyond the capability of State and local combined resources before there is a Presidential declaration. We will continue the 75–25 cost share, although on the intermedial range of disasters, and go to the 90–10 ratio on the really big disasters such as you had in your own State.

Senator Garn. Fortunately, that was the first Presidential declaration we have ever had in the State. So it is a safe place to live, normally. [Laughter.]

U.S. FIRE ADMINISTRATION

We haven't had too many. That slide still amazes me, though. In going down to look at it, it hasn't moved. It is still there.

How much funding did your fiscal year 1987 budget request to OMB contain for the U.S. Fire Administration?

General Becton. Clyde, do you recall that exact number?

Mr. Bragdon. Yes, sir; rounding $7.8 million.

Senator Garn. Could you provide for the record a program and element breakout of your fiscal year 1987 request to OMB?

Mr. Bragdon. Yes, we will, sir.

Fiscal Year 1987 Request to OMB for U.S. Fire Administration

The following table shows the fiscal year 1987 request to OMB for the U.S. Fire Administration:

U.S. Fire Administration	WY	S&E	EMPA	Total
Fire prevention and arson control	5	$247	$3,649	$3,896
Federal fire policy and coordination	5	277	999	1,276
Firefighter health and safety	5	247	999	1,246
Fire data and analysis	5	249	1,150	1,399
Total	20	1,020	6,797	7,817

WY = Work-years.
S&E = Salaries and expenses appropriation.
EMPA = Emergency management planning and assistance appropriation.

Senator Garn. A number of the activities performed by USFA across regions and States, such as the program to change building codes to permit plastic piping for sprinkler heads, are of significant national importance in that it promises the savings of thousands of lives. A USFA campaign on home fire alarms has had a similar effect.

While it is nice to say that State and local governments should pick up these costs, we can see within our bill over $11 billion cuts in housing and revenue sharing alone, it seems highly unlikely that State and local governments will have funds to pick up the U.S. Fire Administration. Given that it will be eliminated, unless funded within FEMA, is it still your recommendation to provide no funds for USFA in fiscal 1987?

General BECTON. It is still our recommendation that we provide no funds for the U.S. Fire Administration. But I would point out that while we propose zero funding, we still will have the National Fire Academy at Emmitsburg, which has been and will continue to be a center of excellence to deal with institutional training as well as exporting training to various regions in the country.

I would ask, if I could, for the Fire Administrator to comment on the program that you mentioned, the sprinkler systems and the other areas.

Mr. BRAGDON. Certainly, without going into depth and detail, most of our programmatic details have been developed in concert with State and local organizations. Therefore, there is a transference that is built into those programs. There are some that are national in scope and so forth and will obviously have some impact and could not be assumed by the bodies that you mentioned.

You specifically mentioned, for example, the residential sprinkler initiative which we are very excited about. We are working very closely in concert with the private sector, and we hope they will continue the momentum that has been developed thus far in those initiatives.

Senator GARN. What groups representing State and local government, if any, did you consult in order to make the determination that they would be picking up the U.S. Fire Administration's funding for fiscal year 1987? Did you have any consultations with State and local government?

Mr. BRAGDON. No, sir.

Senator GARN. This is simply a decision made at the Federal level?

General BECTON. That is correct, sir.

Senator GARN. What funding level will they be supported at? Have you had any indications from them after the announcement of what they are going to be able to do with it?

Mr. SPECK. Go ahead, Clyde.

Mr. BRAGDON. What their ability is to support; no, sir.

STATE AND LOCAL COST SHARING

Senator GARN. You see, the real problem of it is, as a former mayor, I am not one who can sit here and defend all of the Federal programs that shouldn't be cut. Most of them I opposed to begin with and felt that they should have stayed local, and I turned down a lot of Federal funds when I was mayor, because I didn't want the strings and guidelines to go with and get trapped in that mold, so that when Congress did get to this kind of a point, you didn't have the ability to handle it.

Well, whether I can say in hindsight I was right, local and State governments have been hooked on a wide variety of programs. So the difficulty comes in being hit in so many different areas. If it were just the Fire Administration, I would say, all right, they can handle that. That is your bailiwick.

But then it is revenue-sharing funds, and it is UDAG; it is CDBG and it is across the board. As nice as it may be to say: Let's go back—and I certainly agree with the philosophy to have State and local government do more and cut down the involvement of Federal Government—it reaches a point where I don't know how they absorb all of these things. I just don't know how it is going to be possible for them to do so unless, again, you get back to transition periods; jump off the cliff all at once. It is a lot bigger drop than taking it in five or six steps.

So I don't know what the solution is. But it is, no doubt, a problem.

DISASTER ASSISTANCE ACCOUNTING

For the past several years, FEMA has been making an end-of-the-year transfer of obligations from its salaries and expenses to appropriations to the Disaster Relief Fund. At the end of fiscal year 1985, FEMA transferred 11 percent of obligations related to the S&E appropriations to the Disaster Relief Fund. FEMA based the percentage transferred on the ratio of paychecks issued to disaster assistance employees to the total number of paychecks issued to all Agency employees.

This percentage was applied to the obligations for: one, standard level user charges; two, other rent, utilities, and communications; three, supplies and materials. The transfer of obligations totaled $2 million in fiscal year 1985.

It is interesting to note that the amount of unobligated funds in S&E at the end of fiscal year 1985 was $2,052,000. What was the justification for transferring these obligations from the S&E appropriations to the Disaster Relief Fund?

General BECTON. Mr. Chairman, I believe the comments that you read, I saw them for the first time in a document provided by the GAO in a staff opinion. Quite frankly, we do not agree with the assertions that were in that document. It is suggested in that document that there is some illegality or antideficiency committed. We don't believe that to be the case.

What we propose to do is to continue working with the GAO and your staff as openly and cooperatively as possible. We have a large number of members at GAO working in our building, and we don't have to go very far to find them to make sure we can understand each other. We basically think that we have not violated the intent of the Congress. We have not violated the intent of the law. We believe that the information will be clarified once we have a chance to discuss it with them.

FLOOD INSURANCE PREMIUMS

Senator GARN. Last year, FEMA proposed a 14-percent increase in the premium rate charged for flood insurance under the National Flood Insurance Program.

The House-Senate conference on the fiscal year 1986 appropriations bill was able to limit the increase in fiscal year 1986 premium rates to 5 percent.

Actually, it was really the other way around. I was in a difficult position. I was able to get it up to 5 percent, is what it amounted to. It wasn't a matter of limiting it to 5 percent. The House didn't want any increases at all.

Did your proposal to OMB reflect the Agency's intent to make this program self supporting by the end of fiscal year 1987?

General BECTON. Mr. Chairman, our proposal continued to have fiscal year 1988 for self-sufficiency, but I would like for the Federal Insurance Administrator to go into greater detail.

Mr. BRAGG. Mr. Chairman, we did ask, in our proposal to OMB, for a 10-percent increase for fiscal year 1987. I would point out, though, that a lot of the critics of rate increases have used the argument that future rate increases would be a detriment to the policyholder base.

In 1985, we had a more than 6-percent gain in our policyholder base. Already, in fiscal year 1986, we have had a better than 21-percent gain in our policyholder base. Criticisms against the rate increases just have not proved justifiable in our view.

Twenty-seven percent is still only about a $55 increase in the average annual premium. That purchases about $60,000 in coverage. I guess our conclusion is that we would ask you to help us fight that battle yet another year.

CRIME INSURANCE

Senator GARN. I did. I made those arguments last year, and that is how we were able to get to 5 percent. But you know often, particularly in House-Senate conferences, facts don't have anything to do with the determination [laughter] of the outcome.

In the fiscal year 1986 appropriations bill, we provided $10 million and a specific mechanism for the smooth transition of the Federal Crime Insurance Program over to the remaining participating States. This transition mechanism was written to be effective at the start of the calendar year, but with a provision holding its use in abeyance during any period in which the crime insurance authorization was affected.

Congress extended the Federal program until March 17. It is my understanding that FEMA intends to trigger the transition program as of that date unless a subsequent extension of the authorization is enacted into law at that time, even if Congress is considering legislation at that point or such legislation is awaiting Presidential action. Is that correct?

Mr. BRAGG. That is correct, Mr. Chairman. We have shared our implementation procedures with all of the committees that we report to, as well as OMB and our General Counsel, and they have expressed no objections to how we intend to implement the language in the fiscal year 1986 Appropriations Act.

Senator GARN. I would agree with you. I have tried to kill the program as a national program for several years, both in the Banking Committee and here, and there always seems to be a last gasp of life put into it that I don't have the votes to control. I am not against crime insurance.

But if you look at the facts and the statistics there, it is not a national crime insurance program by any means. It is primarily a New York program. Even though the Senator from New York is not here, he has been in this debate with me so many times that I am not saying anything out of school that he hasn't heard me say over and over again.

It seems to me that where such a very few number of States use it that the taxpayers of this country shouldn't be having to support it in those few States and it ought to be a State program. So I will try to help you. I don't know whether we can cut that last gasp of life out of it or not.

Mr. BRAGG. Thank you, sir.

SUBMITTED QUESTIONS

Senator GARN. Gentlemen, I have several pages of additional questions I would like to ask you to respond to in writing if you would, please, and I appreciate you and all of your colleagues being here to testify this morning.

General BECTON. Thank you, sir, for the opportunity.

[The following questions were not asked at the hearing but were submitted for response for the record:]

QUESTIONS SUBMITTED BY SENATOR GARN

RADIOLOGICAL EMERGENCY PREPAREDNESS

Question: In a suit brought by the Justice Department, a Federal judge recently held that the regulation of radiological health and safety has been preempted by the Atomic Energy Act, thus overriding any action by State and local governments that would obstruct the nuclear emergency planning process either actively by legislation that impedes utility plans or passively by refusing to participate in emergency planning.

In light of this decision, do you have sufficient funds in your budget for both FY 86 and FY 87 to review, test and approve utility emergency plans for nuclear power plants?

Answer: There have been two major unanticipated drains in FY 1986 on the financial resources of the FEMA's Radiological Emergency Preparedness (REP) program. These are the activities related to the Shoreham exercise and to the Seabrook plan review and exercise process. Special Nuclear Regulatory Commission (NRC) requests, generic issues requiring more investigation, participation in hearings, and the reduction in FTE have also resulted in a negative impact on the REP budget. This resource drain will likely cause delays in required exercises necessary to maintain licenses.

Question: Do you have sufficient funds in your budget for this fiscal year to complete the exercises at New England's Seabrook plant in an expeditious time frame?

Answer: At this time, FEMA cannot guarantee that unexpected problems will not occur in connection with New England's Seabrook plant.

Question: If you do not, have you started the process to reprogram funds or to request additional resources to carry out this important function?

Answer: FEMA is currently looking into possible ways to obtain additional sources of funding to offset the unanticipated expenses.

CONTRACTING EFFICIENCY/SOLE-SOURCE CONTRACTING

Question: Last year this Subcommittee expressed some concern over acquisition management and the number of sole source contracts. The result seems to be a reluctance to do anything as evidenced by almost $13 million in FY 85 EMPA funds that were lapsed due to an inability to obligate the funds. It has been further estimated that 100 actions totaling over $30 million will not be made in FY 86 due to staffing and other problems.

What specific changes will take place in FY 86 and FY 87 to both reduce the number of sole source contracts and increase the efficiency of the Office of Acquisition Management?

Answer: With regard to reducing the number of sole source contracts, the Federal Emergency Management Agency (FEMA) has taken several strong steps. In FY 1985, a competition advocate was appointed by the Director. Our regulations and internal procedures were revised to give this competition advocate the authority and responsibility to review all sole source contracts in the planning stage and to review all sole source contracts over $100,000 during the pre-award phase. The competition advocate has to review and approve the justification for noncompetitive procurement; this is in addition to the normal review of the noncompetitive justification by the contracting officer. Also, the competition advocate has begun a process of setting competition goals on a directorate-by-directorate basis.

In addressing the question of improving contracting efficiency, the Office of Acquisition Management is implementing an automation project using micro-computers and software previously developed for other agencies to automate the production of solicitations and contracts. This process is now underway; and we hope to have it fully or nearly implemented by October 1, 1986.

It should also be pointed out that we don't believe that efficiency is a problem within the Office of Acquisition Management. The attached two charts reveal that FEMA contracting is one of the most efficient contracting agencies when compared to most other agencies, either in terms of dollars awarded for contract specialists or numbers of actions awarded for contract specialists. In fact, we are proud of our level of productivity. While $13 million was unobligated at the end of FY 1985, only $6 million lapsed. The remaining funds are associated with the two-year purchase of property program and will not expire until September 30, 1986. The funding lapse was caused by a combination of reduced staff and increased workload.

PROCUREMENT EVALUATION

Question: No procurement system evaluations are planned for the second year in a row by FEMA's Office of Acquisition Management. When do you plan to set up these reviews of ongoing contracts?

Answer: When we realized that staff reductions in the Office of Acquisition Management eliminated our ability to conduct procurement system reviews, we contacted the General Services Administration (GSA) to enlist their support for review assistance. They agreed to conduct a review for us, but there has been some delay in the initiation of this review. In addition, we issued a solicitation at the end of FY 1985 to obtain an independent and comprehensive review of Acquisition Management. However, lack of funds availability necessitated cancellation of this solicitation. As funds become available, we will consider this option once again. Finally, because the Office of Acquisition Management does not have the staff to conduct such reviews, and no staffing relief is in sight, we will also seek assistance from two other internal organizations for this review activity, the Office of the Inspector General and the Program Analysis and Evaluation Office.

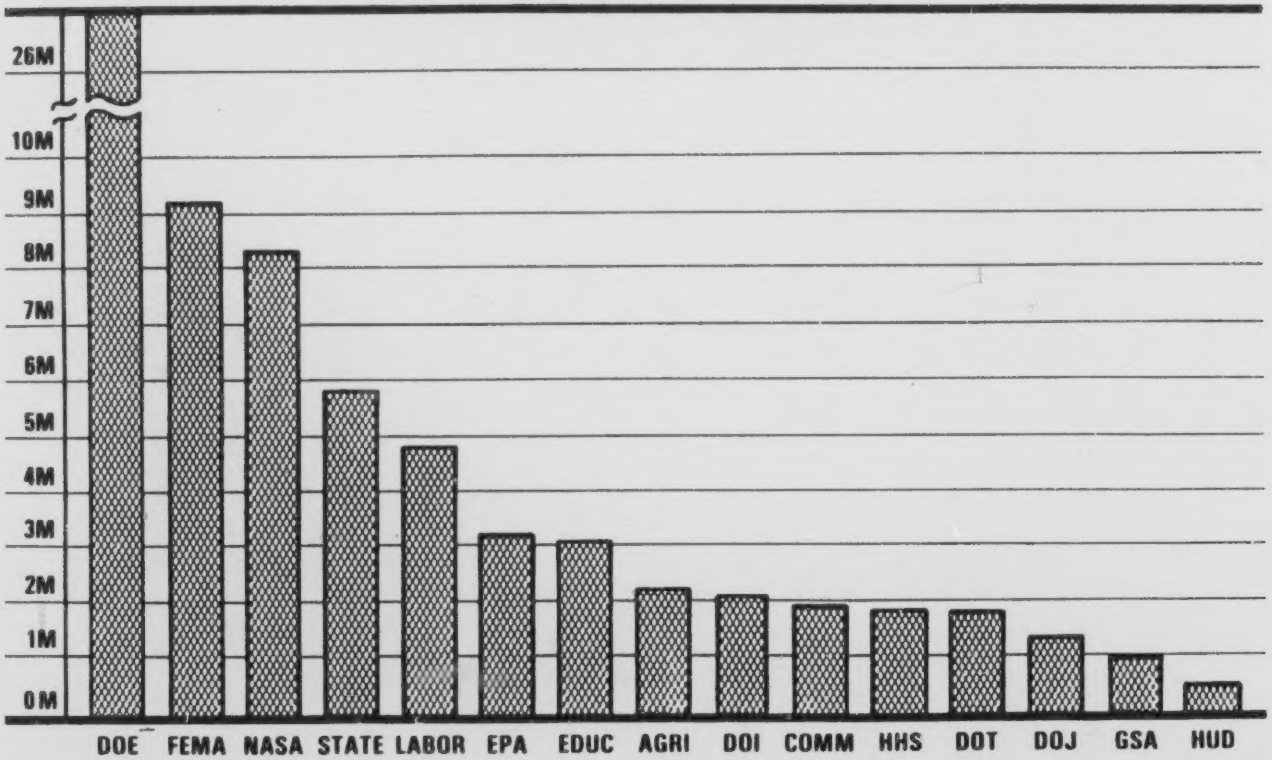
CONTRACT ADMINISTRATION

Question: Contract administration is being performed on a crisis basis only. What should be ongoing are: (1) review of contract bills and invoices; (2) evaluation of contract performance; and (3) closeout of contracts. When specifically do you plan to address this issue?

Answer: The Office of Acquisition Management actually accomplished a great deal of contract administration. Although we must admit, because of the shortage of staff, we are required to give higher priority to obligating the dollars to address the problem mentioned in the question above concerning efficiency and funds lapse. All of our contracting activities spend a great deal of time carefully reviewing invoices and processing bills for payments. A considerable number of contracts are routinely closed out even though we have a significant closeout backlog. For this reason, we have begun discussions with several firms and other agencies who are now contracting out for closing out contracts. As funds become available, we will give serious consideration to this option.

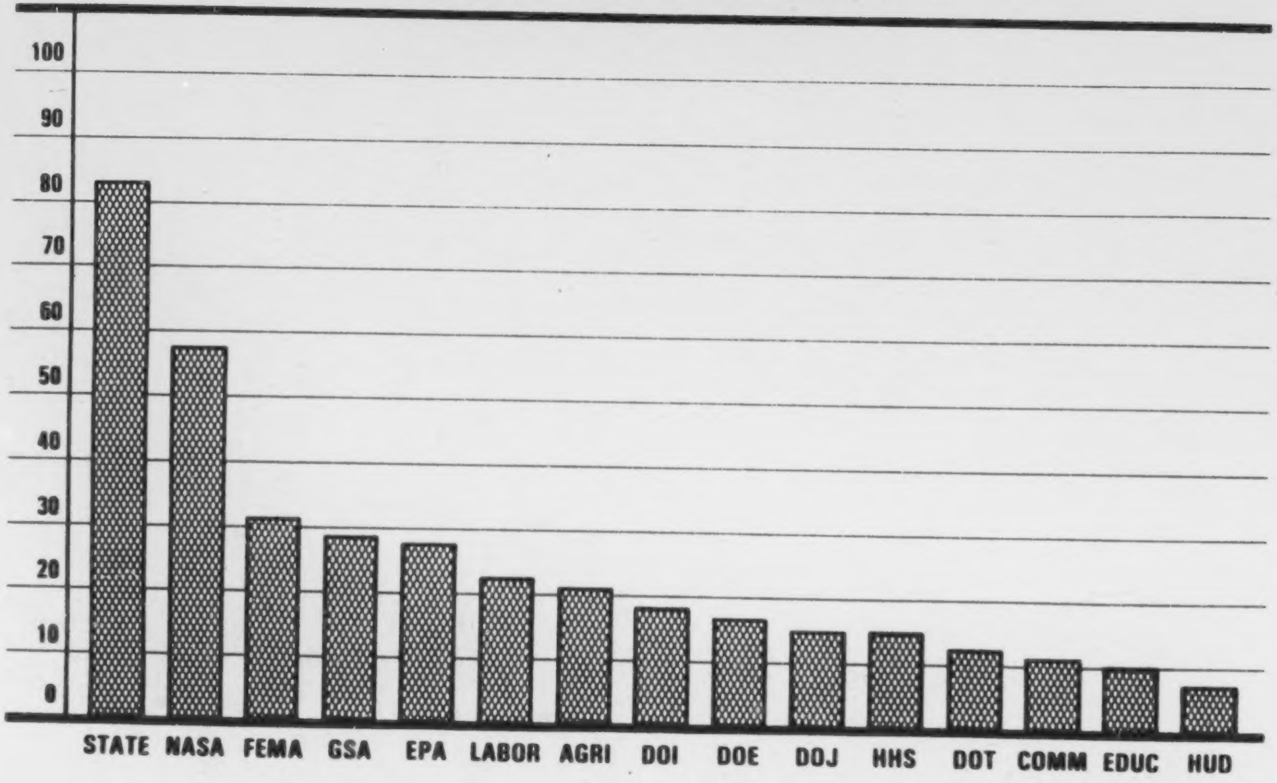
FISCAL YEAR 1983

AGENCY BY AGENCY WORKLOAD COMPARISON
DOLLARS PER SPECIALIST



FISCAL YEAR 1983

AGENCY BY AGENCY WORKLOAD COMPARISON
ACTIONS PER SPECIALIST



NETC WEST

Question: What are your plans for the remainder of FY 86 and FY 87, and further years for NETC West?

Answer: Except for those activities that were contracted for in FY 1985, which will continue, all plans for FY 1986, FY 1987 and beyond have been placed in abeyance.

TRAINING AND EVALUATION

Question: FEMA is conducting emergency training programs under the Emergency Management Institute and the National Fire Academy at its Emmitsburg, Maryland facility.

In the past, the trainee or the individual's employer paid $11.00 a day for food. FEMA paid a stipend to cover travel costs and provided the lodging in on-site dormitories at no cost to the students.

In your FY 87 budget, you have proposed eliminating all assistance to resident trainees at NETC, including travel stipends and the provision of free lodging. What do you think this will do to the approximate 7,600 resident student attendance level at Emmitsburg you have experienced in the past?

Answer: Resident student numbers would generally decrease as resources were used through new initiatives in the field deployment mechanisms and the redesign of resident course materials in order to facilitate field training (through the States, using Home Study programs, teleconferencing, computer-assistance instruction, etc.), where appropriate.

Objectively, FEMA's ability to solve training deployment problems created through the loss of the student stipend program is complicated by cuts already initiated, as well as future cuts expected due to the Balanced Budget and Emergency Deficit Reduction Act of 1985.

Predictably, there will be a significant initial decline in the enrollment levels; however, the student drop-off is expected to be a temporary one, an adjustment period for NETC as well as affected State and local officials. Nonetheless, the "mix" of resident and field training will have to be adjusted with concomitant changes in the composition of the resident student body. Maintaining the exchange of information, techniques, and "cross-fertilization" among students from a wide area and different backgrounds will be difficult. Also, long range and indirect goals; e.g., training, architecture, and engineering students in hazard reduction and mitigation through programs for instructors and professors, will be difficult to sustain. However, the courses offered at the Emergency Management Institute and the National Fire Academy are of such a quality that communities will find the means to send students.

Question: What do you currently predict for FY 87?

Answer: For the Emergency Managment Institute, 2,680 resident students, and 2,520 resident students for the National Fire Academy.

Question: Do you feel that any reduced attendance would reflect cut backs from specific geographic sections of the country? If so, which sections?

Answer: Yes, those individuals who are within one day's commute to Emmitsburg will continue to take advantage of the NETC resident programs. Students from volunteer organizations, urban areas, and greater distances, may require a longer adjustment period to arrange for funding through their budgetary processes; but the quality of NETC training is expected to be attractive at greater distances in the longer term.

Question: Similarly, would certain sub-groups within your student population be less likely to send students in FY 87? If so, which sub-groups?

Answer: Yes, as stated previously, some groups, such as volunteers, students from urban areas, and students beyond the one day commute distance, may require more time to arrange funds for travel and lodging. However, this decline in enrollment is expected to be temporary and last only until the State and local budgetary processes can be adjusted.

TELECOMMUNICATIONS AND WARNING UPGRADE

Question: This Subcommittee, in its FY 85 Report 98-506 and FY Report 99-129 Appropriations Bill, targeted Telecommunications and Warning as the most time critical and highest priority in the Civil Defense program. The intent was to replace obsolete equipment with current state-of-the-art equipment that could be maintained at significantly lower costs in the future than the leased telephone lines whose costs are escalating. The Subcommittee objective was to upgrade spending from FY 85 through FY 87.

Would you please indicate what specific progress, above the levels initially planned for in FY 85 and FY 86, has been made or will be made by the end of FY 86?

Answer: Our plans for FY 1985 and FY 1986 were to continue the upgrade and/or modernization of the telecommunications and warning systems and services based in part on the antiquity and expensive maintenance costs associated with the existing equipment. The combined budget reductions of FY 1985, FY 1986, and the Balanced Budget and Emergency Deficit Control Act reductions have, however, resulted in a cumulative cutback in the telecommunications and warning upgrade. Major telecommunications and warning program activities and progress are as follows:

1. FEMA Switched Network (FSN).

The FSN baseline network is configured with four types of telephone switches. Type I will be installed at the FEMA Special Facility; Type II at the Federal Regional Centers (FRC) and Regional Offices without an FRC; Type III at Regional Offices; and Type IV in the Disaster Assistance Program. An order was issued in FY 1985 for Type I switch at the Special Facility, Type II for Regions I, II, III, and IX, and four Type IV switches for the Disaster Assistance Program. In FY 1986 an order was issued for Type II, switches for Region V and VII. Four Type II, four Type III, and 16 Type IV switches remain to be procured and installed at an approximate cost of $16.4 million. The following FSN activity is anticipated to be completed in FY 1986.

(a) Procurement and field testing of a portable telephone switch at disasters in Pennsylvania and California.
(b) Outmoded FEMA National Teletype System (FNATS) message switching computers to be replaced with regional network.
(c) Incorporation of a new Communications Security (COMSEC) device into the FSN.
(d) Modification of the FSN implementation to provide for special classified requirements.
(e) Development of a telephone cutover scheme that is transparent to users of the old equipment.

2. FEMA National Radio System (FNARS). Communication terminals, antennae, modems and ancillary equipment will be procured to support the High Frequency radio equipment acquired during FY 84 and FY 85 in six Regions, the Special Facility and 24 States. The FNARS program has four Federal Regional Centers, five Regional Offices and 33 State Emergency Operation Centers remaining to be completed at a cost of $18 million.

3. National Warning System (NAWAS). The NAWAS Meteor Burst communications system acquisition, and the modernization of the National Warning Centers have been postponed indefinitely due to lack of sufficient funding. The MB system will require $22 million to complete and the Warning Centers modernization will cost approximately $230 thousand.

Question: What can be done to reallocate the overall priorities within FEMA to complete the necessary upgrade of Telecommunications and Warning by the end of FY 88?

Answer: The 1987 Civil Defense budget request has been reduced from the 1986 appropriation as part of the overall government effort to reduce the deficit. This request provides a status quo in the operations and maintenance of existing Telecommunications and Warning systems.

Options available for reallocating overall priorities within FEMA could take any of the following modes in order to complete the necessary upgrading of Telecommunications and Warning systems by the end of FY 88:

1. Reallocation of resources within FEMA, but outside Telecommunications and Warning . We recognize the necessity of completing the upgrade of the Telecommunications and Warning systems. However, the current financial environment in FEMA will not allow for reallocation of its overall priorities without causing devastating impacts upon other FEMA programs and services. Additionally, the Congress has deemed it appropriate to exclude or "fence" certain programs from the reallocation process, which further restricts our flexibility.

2. Reallocation of funding resources within Telecommunications and Warning at the current estimated levels is not a viable alternative since present basic operations and maintenance costs are averaging $12.5 million per year and the remaining minimal program funds would not provide any single system completion.

3. Allocation of additional funds, fenced by specific Congressional direction. We would recommend that once adequate funds are appropriated, the Committee consider "fencing" the Telecommunications and Warning budget, thereby ensuring the availability of approved funds to complete the necessary upgrades.

REGIONAL OFFICES

Question: Last year, you proposed to close four regional offices. During FY 86, there will be a reduction of some 50 personnel from the regional staff.

In light of these reductions, will you be able to keep all ten regional offices open in FY 87?

Answer: Yes. The regional offices are the primary source through which the agency's policies, programs, and program objectives are delivered and accomplished at the regional, State, and local levels. It is my intention to continue the operation of all ten regional offices.

GRAMM-RUDMAN-HOLLINGS

Question: What are the major implications of the 4.3 percent FY 1986 Gramm-Rudman-Hollings reduction?

Answer: The Agency intends to absorb the 1986 reduction of $5,306,000 in salaries and expenses by cuts in travel and other objects to the extent we are able. We are hopeful that furloughs will not be required. A reprogramming proposal will be presented that would distribute these cuts so that the Agency can continue operations through the balance of FY 1986 in the most optimal manner.

A survey of program managers revealed that the salaries and expenses reduction added to the program funds reduction of $12,649,000 for a total of $17,955,000 and spread equally on a 4.3 percent basis would result in terminations of many planned projects and activities. Some of the major impacts for 1986 would be:

- Reduction in emergency preparedness planning and capability due to loss of about 200 local level planners as well as some staff at the State level (Emergency Management Assistance).
- Loss of approximately 30 Individual Mobilization Augmentees at the State and local levels degrading both planning and response capabilities.
- Delay in hiring of 10 vacant State Radiological Protection Officers.
- Reduction of the level of effort available to calibrate and maintain radiological instruments in State workshops.
- Deterioration in State and local emergency operations planning. Ten or more States would have to eliminate one or more planner positions (Population Protection Planning).
- Erosion of nuclear attack preparedness due to lack of facility survey data necessary for Population Protection Planning.
- Reduction in program support available for the Radiological Emergency Preparedness program seriously impairing the Agency's capacity for assessing off-site preparedness around commercial nuclear power plants.
- Reduction in ongoing hurricane preparedness projects in South Carolina and North Carolina.
- Decreases below what is already a maintenance-only mode in Telecommunications and Warning meaning deterioration in capability in many systems.
- Reductions in training courses, offerings and materials available for use by State and local trainers in all curriculum areas.

- Minimum level of repair and renovation at the National Emergency Training Center.

- Reduction in FEMA direct support for States and localities in flood plain management, and in flood study effort necessary to convert all remaining unstudied communities to full program status.

Question: What would be the major implications of a 15 percent to 20 percent sequestration below the request level in FY 1987?

Answer: A 15 percent to 20 percent sequestration in FY 1987 would require the Agency to review all of its programs and operations. Reductions of this magnitude would inevitably result in fundamental changes in the Agency's program offerings, in the way we deliver these programs, in the level of emergency management and response staff at the Federal, State and local levels that our programs support and even in the number of operating locations, including our regional presence, and in the telecommunications and warning systems that we could sustain. It is important to note that given the current "absolute minimum possible" status of many of our programs, cuts of 15 percent to 20 percent may well mean wholesale termination of programs. Such a result would signal the end of the State-Federal partnership embodied in our authorizing legislation and a marked decrease in the Nation's capability to plan for, mitigate, respond to and recover from all civil and national security emergencies.

Some of the potential consequences of a 15 percent to 20 percent sequestration in 1987 might include:

- Elimination of National Preparedness Programs including projects concerned with health/emergency medical preparedness and other life support essentials, industrial emergency preparedness, and mobilization preparedness planning.

- Major reductions in employment of the cadre of trained State and local emergency managers and supporting staffs.

- Loss of Radiological Officers in 8 to 11 States and decreased radiological protection preparedness.

- Cuts in technician staff leading to suspect readiness of radiological instrumentation affecting ability to support even peacetime radiological emergencies.

- Elimination of a total of 40-65 population protection planners in at least 40 States.

- Cessation of progress in equipping broadcast stations with Electro-Magnetic Pulse (EMP) protection.

- Withdrawal of funds for program support for the Radiological Emergency Preparedness Program resulting in major delays in the nuclear power plant licensing and recertification process.

- Cuts in hurricane storm surge modelling delaying evacuation planning efforts at least a year for the Long Island Sound Basin and the Apalachicola Basin in Florida.
- Cuts in funding for 19 State earthquake hazard reduction programs halting progress on reducing the potential for serious loss of life in earthquake prone areas.
- Major reductions in training available to State and local emergency responders. Operations and maintenance would be reduced so much that some buildings at Emmitsburg would have to be "moth- balled" and library, security and other services would have to be drastically curtailed.
- Cuts in disaster relief program administration requiring staff and expenses reductions and causing significant adverse effects in timely and efficient delivery of services to disaster victims, especially in large scale disasters, e.g., Fall 1985 flooding disasters in the Northeast.
- Elimination of FEMA direct support of community flood plain management, as well as indefinite postponement of conversion of remaining unstudied communities. Reductions would preclude adequate oversight of the National Flood Insurance Program servicing agent and other contractor activities.

REDUCTIONS IN FORCE

Question: FEMA announced a Reduction-In-Force (RIF) of 200 permanent employees early in February, 1986. Why are you scheduling completing the reduction of the 150 positions in headquarters prior to initiating the reduction of 50 positions across the ten regional offices?

Answer: The need to reach agreement with OPM on the results of their audit findings on FEMA's regional jobs is the reason for the delay of the reduction-in-force in the regions.

Question: Will you be able to address the improperly high classification of FEMA employees cited by the Office of Personnel Management (OPM) at the same time that the RIF's take place?

Answer: For a number of administrative and procedural reasons, it is more efficient to deal with the reduction in force and any required position downgrading actions at the same time.

GS 11-15 POSITIONS

Question: FEMA, in the OPM's March, 1983 study, had 61% of its employees in GS Grades 11-15 compared to 38% government-wide. By September of 1985, FEMA had increased 3% in these grades while the rest of the government increased 1% in the same catgories.

Analysis of GS/GM categories on 9-30-84 and 1-31-86 reveals that: GS/GM 15 went from 8.2% to 8.5%; GS/GM 14 went from 11.2% to 11.6%; GS/GM 13 went from 14.9% to 16.4%; GS 12 went from 15.1% to 18.3% (reflecting primarily an activity exempt from the hiring freeze); GS 11 went from 9.4% to 8.4%; GS 9-10 went from 9.4% to 6.2% and GS 1-8 went from 31.9% to 30.6%. These percentage changes reflect a reduction of 177 positions.

Has FEMA developed a long range plan for addressing the "bulge" within the GS 11-15 grades?

Answer: First, a comment about the statistics. They reflect for the most part, changes in the grade distribution of the work force as the result of continuing hiring and promotion freezes. As is generally the case, a disproportionate amount of the staff losses over the past 18 months has been in the lower grade ranges. This will naturally result in their being a higher percentage in the upper grade ranges, since the statistical base has changed, as opposed to any conscious management hiring decisions.

In the short term, this prospect is unlikely to change. The current reduction in force may have some impact in this area, but major changes, considering the comparatively small base, will take some time to achieve.

Question: What will your approach be?

Answer: The Comptroller and the Director of Personnel have been charged to work with management to develop revised staffing patterns for FEMA's organizations that reflect an overall reduction in average grades. As vacancies occur in the future, they will be filled at the grade levels consistent with these approved staffing patterns.

SALARY SHORTFALLS

Question: FEMA has attributed its shortfall in FY 1985 salaries and benefits to factors which include not budgeting for within-grade step increases and merit pay awards. Because FEMA did not budget for within-grade increases in FY 85, it had to absorb a resulting shortfall of $376,000. Similarly, because FEMA did not budget for merit pay awards in FY 85, it had to absorb an additional $1,129,000.

What is the FY 87 FEMA estimate for within-grade step increases?

Answer: The FY 1987 estimate for within-grade step increases and merit pay increases is $835,000 in Salaries and Expenses and $78,000 in the National Flood Insurance Fund for a total of $913,000.

Question: How much is provided for in the proposed budget?

Answer: The total amount of $913,000 is provided for in the FY 1987 request.

Question: How much do you expect to spend for merit pay awards in FY 1987?

Answer: FEMA expects to spend approximately $250,000 on merit pay awards in FY 1987.

Question: How much has been provided in the proposed budget for merit pay awards and for GS awards?

Answer: A total of $256,000 is budgeted for awards in FY 1987.

STAFFYEAR TRACKING

Question: On October 1, 1984, a new information system became operational in FEMA -- the Integrated Staffyear Information System (ISIS). One of the System's key features is its ability to measure staffyear usage against authorized budget program levels. We understand, however, that the system currently cannot produce reports that integrate staffyears used with dollars spent.

Given this limitation, how can this information system be used to effectively manage staff resources?

Answer: At this point, the ISIS is a management information system solely for capturing work efforts (workyears) expended on the various programs for which FEMA is responsible. Since workyears expended are reported against agency allocations, by organization and program, a manager can track whether efforts need to be increased or decreased in a given program. Financial data would have to be extracted from budget and accounting reports.

Question: Are there plans to integrate dollars spent with staffyear information?

Answer: Currently, there are no plans "on the books" to integrate financial data with the ISIS due to the complexity of the issue, the various data bases involved, reporting procedures, and severely reduced staff levels to properly analyze the project.

Question: If so, how soon? At what cost?

Answer: Costs for such an effort cannot be assessed until the entire process of integrating the financial and workyear systems is reviewed.

RADIOLOGICAL EMERGENCY PREPAREDNESS

Question: On pages 4 and 5 of your opening statement, you indicate a legislative proposal to reimburse the Treasury for half the costs of FEMA's offsite emergency response planning relating to commercial nuclear plants.

How will this reimbursement to the U.S. Treasury assist FEMA in maintaining the staff necessary to conduct these activities?

Answer: This proposal, if implemented, would indirectly assist FEMA to fund 50% of the costs, including staff, of the agency's Radiological Emergency Preparedness program. The principle underlying this proposal is that users of Federal services should recompense the Treasury for these services. While the fees collected are not credited to the particular agency's appropriation, it does help to offset the cost of the targeted program activities and assists in deficit reductions.

DOSIMETERS

Question: What would be the effect of continuing the cap on pilot production of dosimeters if it were extended through the end of FY 87?

Answer: The cap on pilot production is interpreted to be 30,000 units completely assembled at Rolla per year. Each unit is counted whether or not it passes all the tests. The assembled units reflect instruments with various modifications which are made to determine acceptability of the end product with respect to the requirements of the Federal Emergency Management Agency (FEMA), the military services, and the National Aeronautics and Space Administration (NASA). At this time, it appears that the cap is a reasonable limit through FY 1987.

Although present pilot production levels are running well below the cap, it is recommended that the cap be retained at the present level. This will make it possible to cover any extenuating technical problems.

We believe that the cap will not impede our ability to achieve the capability to enter into contracts with the private sector in FY 1988 and the outyears for a modest production program which would also provide a base upon which high levels of production could be surged in the event of a national emergency to achieve the 68 million requirement.

Question: How many units and of what type were completely assembled during FY 85 and in FY 86 to date?

Answer: In FY 1985, there were 3,178 units completely assembled. About 3,128 were low range and about 50 were high range.

Through February, 1986, the following have been assembled: 200 low range and 75 high range for a total of 275.

It is estimated that the following will be assembled by the ıd of FY 1986: 4,000 low range and 3,000 high range for a total of 7,000.

These figures are based upon agreements to provide both high and low range dosimeters to the Army and Navy for extensive testing. The quantities to be assembled are much higher than those to be delivered for testing because engineering problems will result in high attrition rates. This is to be expected in pilot production.

Question: What is the estimate for FY 87?

Answer: The estimate for FY 1987 is about the same as for FY 1986, about 7,000 dosimeters assembled.

Question: Would you please bring us up-to-date on revisions in the design of the low level dosimeter that have taken place?

Answer: The low level dosimeter design has changed considerably since pilot production was commenced, but mainly in the dimensions and shape of internal components. Changes were made based on tests performed on assembled instruments and affected the following major performance characteristics:

-- Ease of Reading: Illumination was improved and the eyepiece optics were changed so that the entire scale could be viewed by a person wearing glasses.

-- Shock Stability: This problem was solved by: (1) the use of low vapor pressure grease to trap loose particles; (2) dimensional changes to eliminate relative movement of parts; (3) changes in component design and method of application to prevent the epoxy sealing resins from penetrating above the electrostatic shield; and (4) general improvement in the handling and cleaning of parts. We believe that we now have a complete handle on all factors contributing to this important performance requirement for low range dosimeters.

-- Electrical Stability: The use of greases to trap particles introduced serious electrical leakage problems. This was solved by eliminating grease on or near the insulator and by improvements in the care and handling of components. This applies also to the high range design.

-- Hermetic Seals: Much effort went into achieving internal component designs and procedures that would yield consistent results. Reproducible production techniques for formulating, processing, and applying epoxy resins were developed for both low and high range dosimeters.

-- Humidity Sensitivity: Water vapor penetration of the instrument is possible even when the instrument will withstand exposure to both high vacuum and water immersion. We are continuing tests of alternative materials and coating processes for improving performance in this regard for all ranges.

Many design improvements were made to tooling, fixtures, and molds.

Question: What can we expect for FY 87 in improvements in this area?

Answer: For FY 1987 we can expect improvements in the following characteristics:

-- Stability of the range capacitor for high range dosimeter (0-200R, 0-600R).

-- Design of an intermediate range dosimeter (0-20R).

-- Design of a dosimeter/ratemeter-timed with a watch to provide radiation rate information.

-- Improvements in optics for high and intermediate range dosimeters.

-- Design improvements aimed at decreasing direct labor in mass production.

YEAR END FUND TRANSFERS

Question: FEMA has had an end of the year practice of transferring selected obligations from the Salaries and Expenses account to the President's Disaster Relief Fund.

Another FEMA practice has been to pay the salaries of "temporary" staffers employed at headquarters and regional offices on a more or less permanent basis from the President's Disaster Relief Fund instead of the Salaries and Expenses account.

Would you please explain exactly what transpires in these transactions, what is and is not covered, and the legal basis for these actions?

Answer: The GAO opinion questions the practice of transferring from the Salaries and Expenses appropriation selected obligations incurred by this appropriation in support of the President's Disaster Relief Fund. In addition to the direct costs incurred by the Agency in support of the President's Disaster Relief Fund and paid directly from this Fund, the Agency incurs indirect costs which are initially paid from the Salaries and Expenses appropriation. These indirect costs are goods, services, and facilities associated with the provision of support services necessary to sustain the direct work effort of the Disaster Assistance Employee paid from the Disaster Relief Fund. These indirect costs are incident to the accomplishment of the work performed by Disaster Assistance Employees paid from the Disaster Relief Fund and must be charged to that Fund. Otherwise, the Agency would be using funds appropriated in the Salaries and Expenses appropriation to augment the President's Disaster Relief Fund.

The General Accounting Office has questioned FEMA's use of Disaster Assistance Employees (DAEs). DAEs are hired under the authority of section 309(b)(1) of the Disaster Relief Act of 1974, as amended, 42 U.S.C. 5149(b)(1). That statutory provision authorizes "any Federal agency" in performing "any services under this Act" to hire temporary employees without regard to the provisions of Title 5 of the United States Code (emphasis added). The DAE hiring authority in section 309 of the Act explicitly authorizes use of DAEs to perform "any services under the Act," not merely those authorized by section 306. FEMA hires DAEs only to perform services under the Act. We believe that the legislative history and the language of FEMA appropriation accounts shows these expenses may be paid directly from the Disaster Relief Fund.

Question: Would you please carefully review some opinions we have had prepared on these practices and report back to the Subcommittee on your findings by May 15, 1986? My staff will be available to confer with you on this issue.

Answer: FEMA will meet with GAO to present evidence that these practices are consistent with Congressional intent, statutory requirements, and legislative history and will report back to the Subcommittee by May 15, 1986.

ADMINISTRATIVE USE OF DISASTER ASSISTANCE EMPLOYEES

Question: At the beginning of FY 85, the former FEMA Director said that 95 Disaster Assistance Employees (DAEs) were employed to perform ongoing disaster relief work. These employees were over and above those activated to augment the agency's regular staff in specific Presidentially declared major disasters and emergencies.

A DAE utilization report for the period July 1, 1984, through June 30, 1985, showed the number of DAEs performing administrative disaster relief work. In the Regional Offices, there were 63 full-time equivalent (FTE) employees performing such work. FEMA headquarters had 26 FTE's in various offices; such as, the Office of Public Affairs, the Inspector General, and the Comptroller. Salaries for these employees were paid from the Disaster Relief Fund.

FEMA has an appropriation specifically available for paying salaries. Why has FEMA used the Disaster Relief Fund for paying the salaries of employees performing administrative disaster relief tasks?

Answer: FEMA has used the Disaster Relief Fund for paying the salaries of employees performing administrative disaster relief tasks since section 309(b)(1) of the Disaster Relief Act of 1974 ("the Act"), as amended, 42 U.S.C. 5149(b)(1), provides in pertinent part: "In performing any services under this Act, any Federal agency is authorized to appoint and fix the compension of such temporary personnel as may be necessary..." Section 309(b)(1) clearly authorizes the hiring of DAEs to perform all functions, including administrative functions, authorized by the Act. About 90 DAEs provide essential ongoing program and administrative support directly to the fluctuating operations of the disaster relief program.

Question: What is the legislative basis for assuming only some of FEMA's supporting costs for administering the Disaster Relief Act should be paid from S&E?

Answer: The legislative basis for FEMA's distribution of administrative costs between the Salaries and Expenses and Disaster Relief appropriations is in the legislative history of appropriation hearings testimony and detailed justification material submitted to the Congress.

The Budget of the United States Government FY 1980 Appendix, at pages 895-6 says:

> Amounts shown for Disaster Relief Administration reflect a basic change in the manner of funding these activities. Financing of the personnel required to administer the relief program is by direct appropriation, rather than the previous method of reimbursement from the disaster relief account. Expenses related to response to specific disasters will continue to be charged directly to the Disaster Relief account. Again for 1981 in the Justification of Estimates for the Disaster Relief account, the following appears (HUD-Independent Agencies Appropriations for 1981 Hearings, part 7, page 607):
>
> An appropriation of $375.57 million is requested for FY 1981 to provide major disaster and emergency assistance to individuals and State and local government affected by natural disasters. These funds would also cover all administrative expenses directly related to disaster response. A portion of these costs was previously applied to the 3% authorization applied against funds appropriated to the President for disaster relief. Administrative expenses not related to disasters are now funded through the Hazard Mitigation and Disaster Assistance appropriation.

Detailed object class tables included in the justification material have historically included FEMA's planned obligations from the Disaster Relief appropriation for salaries and benefits of DAEs, travel, supplies, equipment and other administrative expenses directly related to disaster response and recovery. No Congressional testimony, report language, or bill language has ever questioned the use of the Disaster Relief appropriation for these types of administrative expenses.

TRANSFER OF THE FLOOD INSURANCE PROGRAM

Question: Last year, the Congress told you to fund the flood insurance program out of Emergency Management Planning and Assistance (EMPA) and Salaries and Expenses (S&E) as had been the practice in the past.

Why then in FY 87 are you proposing to fund both the Flood Plain Management Program and the administrative program costs from the National Flood Insurance Fund (NFIF)?

Answer: The direction received from the Congress on funding for the Flood Plain Management activity and Insurance Activities last year supports the concept that these activities be funded from the National Flood Insurance Fund. The Congress itself directed that funds for these activities be transferred from FEMA's appropriation to repay NFIF Treasury borrowings to the EMPA and S&E accounts. In addition, it is still the Administration's position that, whenever possible, the primary beneficiaries of a program should provide the funding, rather than be subsidized by the taxpayer.

Question: Since we are talking tight budget times and Reductions in Force (RIF's); what is to prevent most FEMA programs from saying part of their people's time spent in activities somewhat related to flood insurance should also be paid out of the fund?

Answer: FEMA is also concerned that the Salaries and Expenses funded through the National Flood Insurance Fund (NFIF) be only for staff directly associated with operating activities under the National Flood Insurance Program. Transferring the S&E associated with large numbers of additional staff to the NFIF would endanger the self-supporting goal. In order to avoid any problems, the budget prepared by FEMA includes line-item controls for the Flood Plain Management activity as well as Salaries and Expenses. As the S&E request associated with the National Flood Insurance Fund is able only to support staff already identified with NFIP activities, it would require the reprogramming of funds from the NFIF to the S&E line-item to support additional staff.

WRITE-YOUR-OWN FLOOD INSURANCE

Question: Would you please bring us up-to-date on the Write Your Own program within flood insurance?

Answer: As of January 31, 1986, the National Flood Insurance Program (NFIP) total policy count reached 2,005,612. This marks the first time the NFIP has surpassed its 2 million policy mark since January, 1981. I strongly believe that the Write-Your-Own (WYO) Program, with its emphasis on reinvolving the private insurance industry in the program, while utilizing their marketing mechanisms to expand these policy bases both geographically and numerically, is meeting these goals. During the sign-up period for FY 1986, more than 250 property and casualty insurance companies, through 128 insurance organizations, signed Write-Your-Own arrangements with FEMA. This is an increase from 48 companies at the close of the first sign-up period in October, 1983. The WYO Program accounted for approximately 630,000 policies as of the end of January, of which 31% or 186,000 had never before participated in the NFIP.

CRIME INSURANCE

Question: What progress has been made in the four States with the largest number of policies towards setting up their own program?

Answer: The top four States in terms of numbers of policies are: New York, Pennsylvania, Florida, and California.

The status of action in New York is unclear, although FEMA staff has had many discussions with the Superintendent of Insurance and his staff.

Pennsylvania has certified that it can assume responsibility for policyholders in that State through an already-established market assistance program, by amendment to the Fair Access to Insurance Requirements (FAIR) Plan Authorization Act, or by mandating a special crime insurance pool.

The Florida Insurance Commissioner has indicated that effective October 1, 1985, a legislatively mandated Market Assistance Plan (MAP) was established. The MAP requires participation of all property and casualty insurers in Flordia and provides access to all such markets.

In correspondence from the California Department of Insurance, it was indicated that some mechanism would be established to continue coverage. The letter further stated that a voluntary program might be recommended or that they might recommend a statutory pool.

Question: How many letters of intent from States indicating willingness to set up their own program have been sent to FEMA to obtain a portion of the one-time funding should the Federal crime insurance program not be reauthorized?

Answer: As of March 18, 1986, FEMA had received certifications from ten of the twenty-six jurisdictions participating in the program.

Questions: How many policies are there currently under the program and how does this compare to last year?

Answer: The program has seen an 8% reduction in the number of policies over the last year.

	January 1986	January 1985
Residential	28,335	31,484
Commercial	9,995	10,169
Total	38,330	41,653

OFFICE OF THE INSPECTOR GENERAL

Question: Last year, FEMA testified that it was supportive of an independent Inspector General for FEMA activities. Do you support a statutory Inspector General for FEMA?

Answer: As I stated in my confirmation hearings, I fully support the Inspector General concept. We are coordinating with the Administration our comments on various Inspector General legislation which has been proposed by both Houses of the Congress.

STATUS OF INVESTIGATIVE CASES

Question: There are several investigations by the Inspector General that have been turned over to the Justice Department for prosecution. Could you bring us up to date as to the status of these cases?

Answer: Currently, the Federal Emergency Management Agency (FEMA) Inspector General has 23 pending cases that have been referred to the Department of Justice (including U.S. Attorneys) for prosecution. In one case, a trial has been completed with the verdict still pending. In five cases, criminal convictions have been obtained and civil recovery actions are now pending. The remaining 17 cases are pending criminal prosecution.

INSPECTOR GENERAL STAFFING

Question: What is the current staffing in the FEMA Office of the IG and what do you estimate for FY 87?

Answer: The Office of Inspector General is authorized 42 full time permanent positions in FY 1986, 28 in headquarters and 14 in the field. They are also authorized two temporary positions funded by the Environmental Protection Agency (EPA) Superfund. Ten full time permanent positions and one temporary are currently vacant. We anticipate filling the vacancies in FY 1987.

Question: Please provide a year-by-year indication of the staffng in this Office from FY 81 through FY 85.

Answer: Staffing for the Office of Inspector General since FY 1981 has been as follows:

FY 1981 -- 40 full time permanent positions (including the security function).

FY 1982 -- 32 full time permanent positions (security function transferred).

FY 1983 -- 36 full time permanent positions (32 authorized plus 4 positions funded through management and administration augmentation).

FY 1984 -- 38 full time permanent and 4 temporary positions (34 authorized, plus one temporary positions funded by EPA Superfund; and 4 full time permanent and three temporary positions funded through management and administration augmentation).

FY 1985 -- 34 full time permanent and two temporary positions (2 temporary positions funded by EPA Superfund).

MULTI-HAZARD RESEARCH

Question: What research did you conduct under the Multi-Hazard Research Program in FY 85 and what will you do in FY 86 and FY 87?

Answer: FEMA has supported research-related activities under the Federal Preparedness Program's Multi-Program Analysis (in FY 1984, Multi-Hazard Analysis) program element.

In FY 1985, FEMA supported a variety of information systems projects, including partial support of the Natural Hazards Research and Information Clearinghouse, the National Council on Radiation Protection and Measurements, and hardware and services to support FEMA staff access to computerized Federal research in emergency management supported by other agencies. Technical analysis for Emergency Management provided sophisticated technical and policy analyses to FEMA on methods of dealing with motivations and incentives for economic recovery activities following a massive disaster. These projects involved total obligations of $186,247.

Funds in this category for FY 1986 will support the Committee for Radiation Research Policy Coordination, an analysis of reduced strategic vulnerability through active/passive defense, and will focus on supporting the creation of a regional industrial emergency management council. Obligations will total $192,000.

Funds requested in this category for FY 1987 will continue to focus on accumulation of, access to, and utilization of scientific and technical data bases needed for technical analyses and program development in emergency management. Subject areas include health and medical, food and water, and other life-support essentials for those who relocate. Funds requested for these projects total $200,000.

Question: Would you please indicate the dollar value of each of the research activities for each of the three fiscal years?

Answer: The specific projects and dollar values are:

1985

Natural Hazards Research & Information Clearinghouse, University of Colorado	$50,000
National Council on Radiation Protection & Measurements	9,205
Annual Analytic Census, Disasters & Emergencies	37,595
Access to Library of Congress Data Bases	4,030
Subscription to NTIS and DROLS Data Bases	500
Technical Analysis for Emergency Management	36,265
Industrial Protection: Hardening Techniques	48,652

1986

Committee for Radiation Research Policy Coordination	$27,000
Reduced Strategic Vulnerability through Active/ Passive Defense	90,000
Regional Industrial Emergency Management Council	75,000

1987

Technical Analysis for Emergency Management	100,000
Program Analyses for Population Protection	100,000

FEMA ADVISORY BOARD

Question: The primary outside input the agency gets on the proposed content and direction of its future research comes from the FEMA Advisory Board.

Last year you provided a list of the names and affiliations of the Members of the Board. Would you please provide an updated list highlighting any changes in membership?

Answer: The FEMA Advisory Board (FAB) is not the primary source of input. Outside input regarding research needs comes from many quarters of the emergency management community. The FAB does occasionally advise the agency regarding general research priorities, although it has not been asked for such advice in the past year. In any case, the FAB is not provided information about specific FEMA research proposals, nor does it make recommendations on funding specific projects.

FEMA Advisory Board Members are:

* Indicates new member since March, 1985.

Dr. Wesley W. Posvar
President
University of Pittsburgh

Dr. Harold M. Agnew
President
GA Technologies, Inc.

Dr. William O. Baker
Chairman (Retired)
Bell Telephone
Laboratories

* Dr. Robert H. Kupperman
Senior Adviser
Center for Strategic and
International Studies
Georgetown University

* Hon. William E. Mayer, M.D.
Assistant Secretary of
Defense (Health Affairs)

Ambassador Paul H. Nitze
Special Assistant to the
President and Secretary
of State on Arms Control

Mr. Robert R. Everett
President
MITRE Corporation

Dr. Alexander H. Flax
President Emeritus
Institute for Defense Analysis

Dr. Jacques S. Gansler
Vice President
The Analytic Sciences
Corporation

GEN Andrew J. Goodpaster (Ret.)

* Mr. W.H. Krome George
Chairman, Executive Committee
Aluminum Company of America

Professor Samuel P. Huntington
Eaton Professor of the Science of Government and Director, Center for International Affairs
Harvard University

LTG Glenn A. Kent (Ret.)
The Rand Corporation

Hon. Steuart L. Pittman
Shaw, Pittman, Pitts & Trowbridge

* Mr. Robert L. Ratchford, Jr.
President and CEO
Dealers Alliance Corporation

LTG Brent Scrowcroft (Ret.)
Consultant

Mr. Francis M. Staszesky
Past President and CEO
Boston Edison Company

Dr. Albert M. Stone
Director of Advanced Research Programs
Applied Physics Lab
Johns Hopkins University

Dr. Edward Teller
Associate Director Emeritus
Lawrence Livermore National Laboratory

Dr. Eugene P. Wigner
Professor Emeritus
Princeton University

CIVIL DEFENSE/NON-CIVIL DEFENSE RESEARCH

Question: Would you please identify the percentage distribution of research in the civil defense and non-civil defense categories for each year from FY 80 through FY 85 and provide estimates for FY 86 and FY 87?

Answer: FEMA has data as follows for FY's 1982-85, and estimates for FY 1986 and FY 1987, regarding agency obligations reported as research and development (dollars in millions):

	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87
Civil Defense Research	$8.4 (46%)	$5.575 (36%)	$4.363 (38%)	$2.3 (42%)	$.096 (3%)	$.1 (3%)
Other Programs	9.9 (54%)	9.725 (64%)	7.137 (62%)	3.2 (58%)	3.335 (97%)	3.0 (97%)
TOTALS	18.3	15.3	11.5	5.5	3.431	3.1

Data are not available for FY's 1980 and 1981. The FY 1980 budgets were prepared and submitted by FEMA's several predecessor agencies, prior to the formation of FEMA. The FY 1981 budget was the first one submitted by FEMA, but the data from that budget are not available. FEMA has provided estimates for FY's 1986 and 1987, but these are very preliminary for non-civil defense research, and reflect the reductions in civil defense research to the level of approximately $100,000, or 1.2% of the civil defense research figure for FY 1982.

EMERGENCY MANAGEMENT INSTITUTE

Question: Two years ago, FEMA testified that about 19% of the Emergency Management Institute budget ($7.4 million) for field training programs was used for an exercise assistance program. Is the exercise assistance program being repeated in FY 86?

Answer: Yes. The Exercise Assistance Program is being repeated in FY 1986.

Question: How much funding is allocated for this activity in FY 86 and FY 87?

Answer: A total of $1,600,000 was allocated in FY 1986 and $1,800,000 is planned in FY 1987.

Question: Would you please provide details, for the record, on this program and the exercises conducted?

Answer: Exercising is FEMA's national medium for the application of training. Emergency managers require continued training and exercising to respond efficiently and in a predictable manner. An exercise is an extended training activity which allows the individual to test his/her knowledge level about functions and hazards. Personnel and communities that exercise are better responders and decision-makers in time of emergency. In FY 1985, large scale successful evacuations of the Gulf and East Coast demonstrated the need for a high level of preparedness.

Over 1,200 exercises were conducted nationally through this program. In FY 1985, exercises included in excess of 95,000 persons. The agency is conducting a program which will consolidate all individual program requirements into one system for management and reporting. This should enhance the agency's ability to determine national preparedness levels and ease the burden on State and local governments.

SENIOR EXECUTIVE POLICY CENTER

Question: How much funding was used for the Senior Executive Policy Center in FY 85 and what do you anticipate spending in each year in FY 86 and FY 87?

Answer: No funds were used for this activity in FY 1985. In FY 1986, the identification of the Senior Executive Policy Center as an organizational entity was discontinued. Any futher seminars or workshops for public and private sector senior executives to learn, share, and develop managerial capacities to deal with disaster and emergency situations would be conducted by the appropriate organizations at NETC. In FY 1986, $50,000 will be used to deliver two conferences. A total of four conferences are planned for delivery in FY 1987 at an estimated cost of $125,000.

Question: What would the effect be of providing no funds for this activity in FY 87?

Answer: No conferences would be delivered and approximately 160 students would be affected.

Question: Would you please provide a detailed list of all conferences, meetings, and other group activities conducted by the Center in FY 85 and FY 86 to date?

Answer: No Senior Executive Policy Center activities were conducted in FY 1985. Any future such activities beyond FY 1985 will be hosted by the Associate Director and conducted by the appropriate NETC organization. No such seminars or workshops have been conducted to date in FY 1986.

CONSULTANTS AND EXPERTS

Question: How much did you spend for consultants and experts in FY 85 and what are your expectations for FY 86 and FY 87?

Answer: For FY 85, the total amount expended for consultants and experts was $212,967. The estimate for FY 86 is $103,936 and for FY 87, it is $63,960.

Question: Would you please provide a listing of individuals and firms representing all the funds spent for consultants and experts in FY 85?

Answer: A list of consultants follows:

Charles H. Agle
Charles H. Anway
David A. Griffith
Richard L. Hermann
Robert N. Heyn
Francis P. Hoeber
Norman R. Hughes
Crispin Kraft
Philip Kronenberg
William A. Lindsay, Jr.
James P. McNeill
J. Lawrence Minetree
Richard W. Sames
Frances T. Shea
Alex Smallberg
Elizabeth H. Smith
Earl M. Sneed
Karl V. Steinbrugge
James L. Underwood
Robert E. Young
Gary Wamsley
Graham Watt

SES BONUSES

Question: How much have you included in your budget for SES bonuses during FY 87?

Answer: The amount paid for SES bonuses are calculated, as prescribed by law, by 3% of the aggregrate payroll of career SES members on-board as of September 30 for the previous fiscal year.

The estimated figure for FY 1987 SES bonuses is $83,000.

QUESTIONS SUBMITTED BY SENATOR LEAHY

TRAVEL STIPENDS

Question: Last year FEMA proposed ending the travel stipend for volunteer firemen to attend training classes at the National Emergency Training Center.

Congress rejected this cut. We believe this training for firemen in hazardous waste response and other dangerous activities is essential and cost effective. Why are you again proposing to cut this small support for travel stipends?

Answer: While we agree that the training for firefighters in hazardous waste and other dangerous activities is essential, State and local governments bear a share of the fundamental responsibility for such risks and the public safety; therefore, they are being asked to pay a larger share of the cost of participating in such training.

FEDERAL PREPAREDNESS INCREASE

Question: I noticed that you are requesting a $32 million increase for federal preparedness. In the face of our very large deficit, why can't this program be frozen for one year?

Answer: Government Preparedness, the only program in this activity with a major increase, is described in a separate, classified submission.

QUESTIONS SUBMITTED BY SENATOR D'AMATO

RESPONSE TO SHOREHAM EXERCISE

Question: General Becton, I'm curious about the precedents in this area. Has FEMA ever made a reasonable assurance of safety based on an evacuation drill without local cooperation?

Answer: The Federal Emergency Management Agency (FEMA) normally does not issue a finding of reasonable assurance of offsite safety based on an evaluation of a radiological emergency preparedness exercise without local cooperation. The exception to this practice has been where another jurisdiction (usually the State) performs compensatory preparedness functions for the non-participating local entity. Examples include the Indian Point site where, in 1983, New York State exercised its compensatory plan for Rockland County which was not then participating in offsite emergency planning and preparedness. Although some inadequacies existed, FEMA was eventually able to give the Nuclear Regulatory Commission (NRC) a report of adequate progress on correction of these errors. On the basis of that report, the NRC did not shut down the Indian Point site. Rockland County has rejoined the planning effort since that time.

Question: When do you expect you will make your recommendation to the NRC?

Answer: We expect to give the NRC a report in about 45 days on the February 13, 1986 exercise at Shoreham.

Question: What are FEMA's options? In other words, what possible recommendations could you make?

Answer: As we explained in our October 29, 1985 letter to the NRC, we will not be able to give a finding of reasonable assurance on offsite preparedness, due to the lack of participation of the State and/or local government in the emergency planning process. This is based on legal decisions about LILCO's lack of authority to perform certain civil emergency functions in its plans. Our report will simply be an account of the exercise scenario and LILCO's performance against that scenario. It is up to NRC to utilize that information in its licensing process as appropriate.

Question: Following each radiological emergency planning exercise, FEMA has held an open meeting at which the public was invited to submit information concerning emergency preparedness and to discuss this general issue. These meetings were held prior to FEMA issuing its evaluation of the exercise so that the public's input could be considered fully. I am not aware of FEMA having scheduled such a meeting concerning the February 13 exercise of LILCO's emergency plan, even though the Presiding Officer of the Suffolk County Legislature, on February 21, wrote FEMA's Regional Director to confirm that such a meeting would be scheduled. Do I have your assurance that FEMA will invite the public to a meeting concerning LILCO's February 13 exercise before FEMA reaches conclusions on the exercise or issues its evaluation?

Answer: FEMA regulation 44 CFR 350 provides for the conduct of a meeting after an exercise, involving the exercise participants, Federal agencies, and the public and media. Such a meeting was held on February 15, 1986, at the Holiday Inn used as the Joint News Center for the Shoreham exercise. Members of the press and public were present. The purpose of the meeting was so that FEMA could share its initial impressions on how the exercise went. After FEMA's presentation, made by the Chairman of the Regional Assistance Committee, members of the press asked questions informally. At least one member of the public also asked questions.

QUESTIONS SUBMITTED BY SENATOR PROXMIRE

GREAT LAKES FLOODING

Question: At a recent International Joint Commission briefing on the current record-high Great Lakes water levels, a representative of your National Flood Insurance Program (NFIP) mentioned focusing on banks and lending institutions as a means of forcing people in flood-prone areas to buy flood insurance. How can the Federal Insurance Administration (FIA) justify pressing people to buy insurance when your adjusters deny the claims of flood victims by saying that their property damage is due to erosion and not flooding?

Answer: Independent claims adjusters are not authorized to approve or deny claims under the program and the flood insurance policy advises policyholders of this fact. The FIA is committed to promptly paying claims whenever the covered property is damaged as a result of flood-related erosion. While it is clear that property damage due to gradual erosion is not covered under the policy, the current record high Great Lakes water levels are, generally, producing flooding conditions in that the lake levels are generally "exceeding anticipated cyclical levels." Consequently, damage caused by flood-related erosion which is being sustained by NFIP policyholders is being paid.

Section 1370 of the National Flood Insurance Act of 1968 sets forth the statutory definition of the term "flood". The section was amended in the Flood Disaster Protection Act of 1973 (PL 93-234) by the addition of a new sub-section "(c)" in order to provide coverage, under the NFIP, for insured loss as a result of "erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels..."

Flood insurance losses recently incurred as a result of flood-related erosion of a kind involving damage to insured buildings and their insured contents (land and land values are not covered) caused solely by waves or currents of water exceeding anticipated cyclical levels will constitute covered losses under the NFIP, so long as flood-related erosion, and not ordinary, gradual erosion was the proximate cause of the loss. In this connection, we must continue to review and decide each claim of flood-related erosion on a case by case basis.

The rationale for our position that the NFIP does not provide coverage for gradual, ordinary erosion is derived from the Report of the Committee on Banking, Housing and Urban Affairs, United States Senate, which accompanied the Flood Disaster Protection Act of 1973 (Report No.93-583, at pp. 14 and 15).

Question: Do you plan any changes in your Great Lakes policy guidance?

Answer: No change in Great Lakes policy guidance is anticipated at this time.

Question: Would you agree that the Great Lakes are currently "exceeding anticipated cyclical levels"?

Answer: After a review of factual data from the U.S. Army Corps of Engineers, along with the legislative intent underlying the Flood Disaster Protection Act of 1973, we believe that the situation which presently exists along the Great Lakes is one in which the lake levels, as established by the available engineering data, are, now, with the possible exception of Lake Ontario, generally "exceeding anticipated cyclical levels", and we note that these levels exceed those which were in effect when the legislation was enacted. Thus, a condition of flooding, as contemplated by the statutory language, generally exists along the Great Lakes and NFIP losses will be investigated and adjusted in the light of this determination. Accordingly, each flood insurance claim will be reviewed on its own merits, inasmuch as we cannot prospectively determine that each loss will be occasioned by a flooding event, in view of the possibility that, as with any given loss, the proximate cause of the loss may be a peril for which there is no coverage under the flood insurance policy (e.g., ordinary erosion, subsidence, earth movement, etc.).

Question: What is being done to better define the terms "anticipated cyclical levels," "storm-related losses," and "normal erosion processes"?

Answer: While we are always receptive to improving the working definitions used in the National Flood Insurance Program, the Congress has provided very useful guidance on the terms in question. For example, to reach a determination that the Great Lakes, generally, are exceeding anticipated cyclical levels at this time, we refer you to the following colloquy on the subject, between the Sponsor of the amendment and another Member, which took place prior to the enactment of the 1973 amendment to Section 1370 of the National Flood Insurance Act, as reported in the Congressional Record:

> "Mr. Young of Illinois. Mr. Chairman would the wording the gentleman has added to this legislation, particularly the words 'exceeding anticipated cyclical levels', will that standard be sufficient so that damages which have been caused by the current levels of Lake Michigan be a flood type of situation where loans could be extended under damage caused by that type of flooding?

> "Mr. Yates. It is my intention and the intention of this amendment to take care of such situations because the levels of Lake Michigan and the other Great Lakes are much higher than the expected cycles the Army Corps of Engineers had anticipated. The cycles of the levels of the lakes vary from year to year. At the present time they are the highest in the history of the country and have resulted in tremendous damage to the owners of apartments and condominiums and homes in my district along the shore of Lake Michigan. I am told the same situation prevails with respect to homeowners who have their homes on the shores of the other lakes. It would be the intention to take care of the situation the gentleman just described."

Regarding the concepts of storm related flooding, which is covered under the Standard Flood Insurance Policy, and normal erosion, which is not, the NFIP has not experienced difficulty in differentiating between these events in the loss adjustment process. In this connection, formal clarification of these concepts evolved soon after the enactment of P.L. 93-234 and were published in the Federal Register, in Volume 41, p 36632, on August 30, 1976. This guidance articulated the loss adjustment practice, as to these concepts, which was then in effect and which has been followed consistently, and reads as follows:

> "Flood related erosion. Under the Standard Flood Insurance Policy, property damage resulting from wave action along a lake or other body of water would be considered a direct loss by flood if the proximate cause of the damage were a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the unusual rapid accumulation or runoff of surface waters from any source."

> "When a sudden surge or force of nature, such as a severe storm, deluge, or hurricane, accelerates the normal wave action or otherwise causes an abnormally rapid and severe inundation and/or sudden washing away of normally dry land areas by water, any structural property damage approximately caused thereby would be covered under the flood insurance policy. However, where normal, continuous wave action, accompanied by ordinary erosion or the gradual and anticipated wearing away of the land, is the proximate cause of structural property damage, there is no coverage."

In issuing this guidance, we relied upon the expressions of Congressional intent published in the Report of the Committee on Banking, Housing and Urban Affairs, United States Senate, which accompanied the Flood Disaster Protection Act of 1973 (Report No. 93-583, at pp. 14 and 15).

SUBCOMMITTEE RECESS

Senator GARN. The subcommittee will stand in recess until Wednesday, March 12 at 10 a.m. in room SD–124, when it will hear testimony from the Environmental Protection Agency on their fiscal year 1987 budget request. The subcommittee is recessed.

[Whereupon, at 11:40 a.m. Wednesday, March 5, the subcommittee was recessed to reconvene at 10 a.m. Wednesday, March 12.]

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

WEDNESDAY, MARCH 12, 1986

U.S. Senate,
Subcommittee of the Committee on Appropriations,
Washington, DC.

The subcommittee met at 10:03 a.m. in SD–124, Dirksen Senate Office Building, Hon. Jake Garn (chairman) presiding.

Present: Senators Garn, D'Amato, Proxmire, Leahy, and Lautenberg.

ENVIRONMENTAL PROTECTION AGENCY

STATEMENT OF LEE M. THOMAS, ADMINISTRATOR

ACCOMPANIED BY:

RICHARD H. MAYS, ACTING ASSISTANT ADMINISTRATOR, ENFORCEMENT AND COMPLIANCE MONITORING
J. CRAIG POTTER, ASSISTANT ADMINISTRATOR, AIR AND RADIATION
J. WINSTON PORTER, ASSISTANT ADMINISTRATOR, SOLID WASTE AND EMERGENCY RESPONSE
A. JAMES BARNES, DEPUTY ADMINISTRATOR
HOWARD M. MESSNER, ASSISTANT ADMINISTRATOR, ADMINISTRATION AND RESOURCES MANAGEMENT
LAWRENCE J. JENSEN, ASSISTANT ADMINISTRATOR, WATER
MILTON RUSSELL, ASSISTANT ADMINISTRATOR, POLICY, PLANNING AND EVALUATION
JOHN A. MOORE, ASSISTANT ADMINISTRATOR, PESTICIDES AND TOXIC SUBSTANCES
DONALD J. EHRETH, ACTING ASSISTANT ADMINISTRATOR, RESEARCH AND DEVELOPMENT
MORGAN KINGHORN, COMPTROLLER
FITZHUGH GREEN, ASSOCIATE ADMINISTRATOR, INTERNATIONAL AFFAIRS

BUDGET REQUEST

Senator Garn. The committee will come to order.

Mr. Thomas, we are happy to have you before the subcommittee this morning in your second appearance before us to present the administration's budget.

For fiscal year 1987, you are requesting a total budget of $4.23 billion. This represents increases of $33.2 million for salaries and expenses and $188.7 million for Superfund. These increases are offset by reductions of $62 million for abatement, control, and compliance and $21.1 million for R&D, for a net increase of $164.9 million. The budget also provides an anticipated $1.8 billion for the Construction Grants Program.

Before we continue, Senator Leahy, do you have any opening remarks you wish to make?

OPENING REMARKS OF SENATOR LEAHY

Senator LEAHY. I thank you, Mr. Chairman.

I also would like to welcome Mr. Thomas here today. I want to publicly thank him again for coming up to Vermont and climbing Camel's Hump with me, and I hope he enjoyed that as much as all the Vermonters that were there did. I want to note a couple of positive areas in the fiscal year 1987 budget.

For 3 years now, we have been asking EPA if it would meet the 1988 deadlines for permits for hazardous waste sites. I am glad to see, in Mr. Thomas' budget, that is a major objective in 1987. It will be meeting those deadlines. I am glad to see that you are asking for the funds to write regulations for all the hazardous air pollutants you decide are dangerous.

In my time of questioning, I will raise some other issues, but I am delighted you are here, and I appreciate the cooperation my office has been getting from yours.

Thank you, Mr. Chairman.

Senator GARN. I didn't know you had anything big enough to climb in Vermont. [Laughter.]

Senator D'AMATO. Fighting words. [Laughter.]

Senator LEAHY. Mr. Chairman, at least you could drink the water out of our big lakes. [Laughter.]

Senator GARN. What is all this I have heard about acid rain up there? [Laughter.]

Senator LEAHY. We don't have acid salt. It is a little State, but there are those of us who love it.

Senator GARN. I love it.

Senator LEAHY. I think anybody from Utah should be very glad Vermont exists. I mention that to some of you illustrous citizens.

Senator GARN. I am.

Senator D'AMATO. Are you suggesting more New Yorkers might possibly be finding our way to Utah if we didn't have Vermont? [Laughter.]

Senator GARN. We will accept Vermonters, but not New Yorkers. [Laughter.]

Senator D'Amato?

PREPARED STATEMENT

Senator D'AMATO. Mr. Chairman, I have a full statement that I would like to have included in the record as if read in its entirety.

[The statement follows:]

STATEMENT OF SENATOR ALFONSE D'AMATO

Mr. Chairman, I am pleased to have this opportunity to be here this morning as we consider the Environmental Protection Agency's fiscal year 1987 funding. Although I know that many of the agencies this subcommittee deals with are of vital interest to New York, it is difficult to think of any agency which is more vital to the health and well-being of all our citizens than the EPA. I would like to comment briefly on several of EPA's programs which will be discussed today.

It is impossible to really consider some of these funding issues without acknowledging the urgent need for the Congress to complete action on several major pieces of environmental legislation. Perhaps the most critical of these is the need to act promptly on the Superfund reauthorization. I notice that in Mr. Thomas' testimony this morning, he discusses the EPA's request of $1.05 billion for the Superfund Program. I expect that eventually we will see a higher level, hopefully at least the $7.5 billion over 5 years authorized by the Senate bill. In the meantime, we cannot ignore the need for interim funding for the program. I have contacted key members of the Senate Finance Committee, the Senate Environment Committee, and the House Ways and Means Committee to urge that they support interim funding until the conference report has been finalized.

It is also crucial that we have swift action on the Clean Water Act reauthorization so that the Sewage Construction Grants Program can proceed on schedule.

I note that today's testimony indicates that the Agency intends to place a high priority in 1987 on the Acid Rain Research Program. Acid rain is a matter of extreme concern to New Yorkers, especially those who live and vacation in upstate New York. Normally, I would be pleased to see a priority placed on research efforts in this area. But I must admit, Mr. Thomas, that I am skeptical. EPA's solution to this problem has been to study, study, and then study some more. I agree with those who believe that, in the case of acid rain, studies have been used as an excuse to avoid action on this problem. I would like to see EPA support a reasonable acid rain mitigation proposal this year. I really get frustrated when I see phrases in your testimony that say EPA is planning to "deepen our understanding" and "carefully assess" this problem, when what we really need is a concrete proposal for action.

I also want to indicate my support for a continued commitment to the Great Lakes Program and the Estuarine Program for water quality management in four important coastal water bodies, including Long Island Sound. I have a few questions for the record regarding EPA's plans for the Great Lakes Program and other issues of importance to New York.

Thank you, Mr. Chairman.

Senator D'AMATO. I would note, Mr. Chairman, since Mr. Leahy has more New Yorkers coming into his State now than native born Vermonters; they are flocking up there. I don't know if he likes it or not, but they are coming in droves.

Senator GARN. Do you want me to help you keep them out, Pat?

Senator LEAHY. In a large metropolitan area where I was speaking, I was asked, "How many people do we have in Vermont?"

I said, "Just about none." [Laughter.]

ACID RAIN RESEARCH PROGRAM

Senator D'AMATO. I would note, Mr. Chairman, that today's testimony indicates that the Agency intends to place a high priority in 1987 on the Acid Rain Research Program.

I have to express my extreme concern on behalf of all of our New Yorkers upstate, and on behalf of all those who live and vacation in our magnificent State. Let the record indicate that New York State is not just Manhattan. We have magnificent country and mountains, beautiful lakes, and we are very, very concerned with those research efforts because I believe that the pace of the acid rain studies have been used to avoid action on the problem.

We continue to hear about the research, and we are not getting a program implemented to cut down on the pollutants. I would say that this is why some of us are rather frustrated when I see phrases in your testimony that say EPA is planning to "deepen our understanding" and "carefully assess this problem" when what we really need is some action and activity to deal with the problem.

So, I want to express, once again, this Senator's concern that this is just another way of avoiding the action necessary to deal with this problem.

Thank you, Mr. Chairman.

Senator GARN. Mr. Thomas, please proceed.

Mr. THOMAS. Thank you, Senator.

I appreciate the opportunity to be with you today. With me are Deputy Administrator James Barnes, the other Assistant Administrators, and related staff on the Agency. I believe you have a listing in front of you of all of these people.

Senator GARN. That is correct.

STATEMENT HIGHLIGHTED

Mr. THOMAS. As opposed to going through this statement, Senator, I will present it to you for the record and just highlight the statement for you and then turn to questions.

It is a pleasure to be here and to present the President's 1987 budget for the Environmental Protection Agency. The budget, I feel, represents a balance between our need to protect public health and the environment through the programs of the Environmental Protection Agency and working toward a balanced budget.

That is the balance that Congress is seeking to achieve; it is the balance that the President is seeking to achieve, and I think this budget proposal that we present to you represents that balance. I think it provides a stable base for the Environmental Protection Agency and it will ensure that we continue and maintain the momentum which we have established over the last several years, with substantial increases in all segments of our budget.

As you indicated, the budget represents an overall request of over $4.2 billion and over 13,000 work-years. This is broken down, basically, into three big components: about $1.4 billion for our operating programs; a little over $1 billion for the Superfund Program; and about $1.8 billion for the Construction Grants Program.

As you indicated, the $1.8 billion in construction grants will be submitted when the Clean Water Act is reauthorized. The $1.8 billion is built into the President's 1987 budget assumptions.

This represents an increase, excluding construction grants, of about $140 million in our budget and a decrease of about 200 work-years when you look at where we are in 1986.

I think it is basically a stable budget with a slight increase in dollars and a small decrease as far as people are concerned, but overall maintaining the strong momentum we have established in all of our programs over the past couple of years.

GRAMM-RUDMAN-HOLLINGS

First, let me say that when we looked at 1986 in the context of the 4.3-percent reduction for Gramm-Rudman-Hollings, the figures called current estimate, is the budget we have after the 4.3-percent reduction. The 4.3-percent reduction is basically taken at the direction of Congress across all of our programs, so it was a fairly even reduction down through all of our programs.

Whether it's operating programs, Superfund programs, construction grants, or State grants, the 4.3-percent reduction was applied across the board. Our 1987 budget that you are looking at reflects, as a component of the President's budget, EPA's part of reaching the $144 billion deficit target that Congress has established. Within that, both for 1986 and 1987, you see our attempt to deal with the Deficit Reduction Act, as well as our assurance of, and proposal for, protecting public health and the environment through the EPA budget.

HAZARDOUS WASTE PROGRAM

Looking at the 1987 budget highlights, you will see, as was indicated by some of your comments already, that a high priority continues to be implementing strong hazardous waste programs. This emphasis on hazardous waste is reflected by the additional resources requested for the Hazardous Management Program. The request includes both a personnel increase and a dollar increase on top of substantial increases during the last 3 years. The budget request also includes an increase of over $500 million for the Superfund Program.

SUPERFUND

Let me digress, just for a minute, to talk to you about Superfund. We are rapidly approaching a crisis in Superfund since we are running out of money. As you know, the taxing authority expired last September. We carried over, from 1985, approximately $200 million. We slowed the program down last August, and we have run on a slowdown schedule since. We are now coming to the point where we are going to begin shutting the program down.

I had a session with Senator Lautenberg and his colleagues on the Environment and Public Works Committee not long ago and we went through where we were with Superfund. I discussed the actions that we would have to take if reauthorization were not quickly passed. We have already begun the actions to shut the program down.

We have begun looking at and developing the personnel procedures for a reduction in force; we have notified our major contractors that we may need to terminate contracts, for the Government's convenience, in the next several weeks.

We are looking at a variety of actions that we may need to take, and we are looking at April 1 as the date when those actions would first become evident.

I would say that the effects of the slowdown started last August, and now the shutdown is becoming devastating to the Superfund Program. It will become extremely difficult to rebuild the program and reestablish the momentum we had last summer if quick action is not taken. Congress must provide not only a reauthorization, but also additional funding.

We are talking weeks, gentlemen, and not months, where we need some relief before really traumatic action has got to be taken by the Agency on that program.

AIR PROGRAM

Turning to the air program, this budget reflects, again, a strong commitment to deal with national ambient air quality standards. We are making a strong commitment to deal with ozone, which is a major issue we will be facing. Also, we provide for a review and possible revision of the sulphur dioxide standard and other standards; also, in air toxics, we request a substantial increase in our Toxic Air Pollutant Program; both the program dealing with regulatory control as well as the program dealing with episodic, acutely hazardous toxic air pollutants.

WATER PROGRAM

In the water program, we show a strong commitment to continue to ensure compliance with the congressionally mandated July 1988 date for the establishment of treatment by publicly owned treatment works throughout the country. A major component of our resources relate to that policy.

Our Great Lakes and Chesapeake Bay programs will also continue as strong programs. As a matter of fact, in the budget you will see funding for two additional bay programs like the Chesapeake Bay program. They haven't been selected yet, but the funding is there. We think that has been an exceptionally positive program and should be expanded.

ENFORCEMENT

Our enforcement budget is continued as a strong part of our budget, as is research.

ACID RAIN

You noted the Acid Rain Research Program. It continues at about an $85 million level. The administration-EPA's component of that goes up. That research program on acid rain goes with our action program, which is tied in with our National Ambient Air Quality Standard Program and our State grant program.

STATE GRANTS

Finally, the overall State grants component of our budget maintains the basic stable funding for State grants that we have for the overall operating budget of the agency. It is a little increase over 1985, about a 4-percent decrease from 1986, but within those grants, you see increases for hazardous waste and underground storage tanks and decreases for some of the other programs. There are mixes within the State grants, but overall, we committed to continue funding the State partnership with the State grant program at the same kind of pace as the Federal program.

In conclusion, I feel like we are presenting a strong EPA budget, a budget against the backdrop of deficit reduction, but one that reflects the priority of the administration for environmental protection. It is a pleasure for me to be here today to answer questions relating to that budget.

[The statement follows:]

STATEMENT OF LEE M. THOMAS

Mr. Chairman and Members of the Committee: I appreciate this opportunity today to review with you the current status of programs at the Environmental Protection Agency and to discuss with you the President's 1987 Budget Request. With me today are the Deputy Administrator, A. James Barnes, and the Assistant Administrators who manage our programs.

We believe the President's FY 1987 Budget strikes a balance between the Agency's mission to protect human health and the environment, and the Nation's need to move toward a balanced budget. Our 1987 request provides a stable and sound resource base that will enable the Agency to maintain the momentum it has developed in the past few years.

OVERVIEW

Our proposed 1987 Budget will bring about substantial environmental progress over the next several years. The President is requesting $4.23 billion supported by 13,161 workyears. The request includes $1.38 billion and 11,445 workyears for our Operating Programs. We are also requesting 1,716 workyears and $1.05 billion for the Superfund program. In addition, the President will submit an amended 1987 request for the Construction Grants program of $1.8 billion once appropriate reform legislation is enacted.

Excluding Construction Grants, our 1987 request is an increase of $139 million, and a decrease of 200 workyears from the 1986 current estimate. The request amounts to an increase of 6 percent in dollars and a decrease of 2 percent in personnel.

The stabilized resource level proposed in our budget reflects the continued high priority the President places on the programs administered by EPA. This request is all the more significant when viewed in the context of the Administration's need to meet the requirements of the Balanced Budget and Emergency Deficit Control Act.

We support the Administration's and Congress' effort to reduce the deficit. Before discussing the details of the President's FY 1987 Budget Request, I would like to briefly discuss our assessment of the effect of proposed sequestration of fiscal year 1986 funds on the Agency's programs as a result of the Balanced Budget Act. Like other domestic agencies that have provisions of the Act have been reduced by 4.3 percent. These reductions will be spread equally among all programs, projects and activities within the Agency's budget, as required by the legislation.

While it is human nature not to welcome any reductions in what we believe are programs of high priority to the American people, we certainly can live within the bounds of the remaining 95.7 percent. I say that with confidence, based on a very careful review and analysis that we undertook and are still conducting at EPA. We will be able to "tighten the belt" and continue to operate viable environmental programs within the FY 1986 constraints of the legislation.

I would now like to focus on the President's proposed 1987 budget for EPA. First, let me begin by saying that this budget will provide sufficient resource levels needed for us to meet our legislative deadlines. If we encounter any problems meeting these deadlines, it is because of the complex and technical nature of the issues involved, not the level of resources available. In addition, our request for Superfund is predicated on the current Administrationsupported reauthorization proposal and we may have to review our resource request once the reauthorization process has been completed. I would like to now highlight several of the key programmatic issues central to the President's FY 1987 Request.

The Control of Hazardous Waste

Uncontrolled hazardous wastes are one of the Nation's most pressing environmental problems. The Superfund program was established over five years ago to address these problems. Since that time, the Agency has begun work at hundreds of hazardous waste sites by addressing both immediate threats to human health and initiating long-term clean-up actions.

The 1987 request for Superfund provides for a program that would continue at the level we developed in our reauthorization proposal to Congress. However, the taxing authority that supports the Superfund program expired last September 30. Until reauthorization is accomplished, there are insufficient revenues to support a Superfund program in 1987.

Although we are temporarily slowed in Superfund, we are pushing forward rapidly in our implementation of the hazardous waste regulatory program under the Resource Conservation and Recovery Act. To support our efforts to implement existing, as well as new, program responsibilities required under the RCRA Amendments, the 1987 request of 1,462 workyears and $256 million represents a 20 workyear and $18 million increase above the 1986 budget. Major priorities in the 1987 hazardous waste budget include implementing a corrective action program, restricting wastes from land disposal, and regulating underground storage tanks. We are also implementing the new corrective action requirements concerning the handling of hazardous wastes at wastewater treatment plants and analyzing possible future restrictions on the underground injection of hazardous waste.

Research to Support Agency Priorities

Our 1987 budget provides the Agency's research and development program with $295 million. Although this represents a reduction of 6 percent below 1986, the request reflects a conscientious attempt to focus the Agency's research program on areas that will yield the greatest benefit to high priority regulatory programs.

Our 1987 research budget will continue to strengthen the Agency's capacity to measure, assess, and control the health and environmental risks posed by such cross-media problems as acid rain, hazardous wastes, and toxic air pollutants.

For example, the 1987 acid rain research program will be expanded to provide accurate and reliable scientific information on which we can base sound regulatory decisions.

Our top priorities for acid rain research in 1987 are:

- To carefully assess the relative contributions of various sources of acid deposition;
- To deepen our understanding of the damage done to materials by acid rain;

The total Federal commitment to acid rain research will be $85 million. The Agency's portion of the acid rain program will increase by 13 percent to $55.1 million.

Maintaining The Agency's Enforcement Effort

Our 1987 Budget will provide the Agency with resources necessary to continue to successfully implement its enforcement activities. Two important areas received increases: hazardous waste, and enforcement and compliance monitoring. The President's request increases funding for hazardous waste enforcement activities by 11 percent. This increase will support our efforts to aggressively address contamination at hazardous waste facilities by identifying and investigating releases, and requiring corrective action. Additional enforcement resources are also requested for enforcement and compliance monitoring to maintain our effort to reduce civil case backlogs and to enhance the criminal enforcement program.

The 1987 Request also continues to fully support two major water enforcement programs, pretreatment and the National Municipal Policy. The basic purpose of the pretreatment program is to control the discharge of toxics into publicly owned waste water treatment facilities. The National Municipal policy seeks to ensure that all such facilities comply with treatment requirements by the deadlines set in the Clean Water Act.

These focused enforcement increases reflect the importance with which we view these areas of our responsibility. Along with actual environmental results, attainment of high levels of compliance with environmental standards is the Agency's most tangible measure of success. Failure to aggressively enforce the law, leading to low levels of compliance, would reduce the overall benefits from our pollution control investments.

Maintaining Grant Assistance Programs

An effective partnership between EPA and the States is one key to successful environmental management. The increasing number of EPA programs delegated to the States underscores the need to implement a consistent policy on EPA/State relations. EPA's 1987 Budget allocates a total of $270 million for grant assistance programs. While the total grant levels are reduced, we believe that program impacts can be kept to a minimum. We intend to work with the States in helping to develop reasonable systems that will increase revenues to offset our proposed reduction. For example, I am convening a task force to examine new means to collect user fees; the States should be able to take advantage of EPA's innovations in this area. Hazardous waste grants for RCRA implementation and underground storage tanks increase by $11 million primarily to support requirements of the 1984 RCRA Amendments. These increases will support additional State efforts to enforce compliance at hazardous waste facilities, and to support State underground storage tank enforcement activities.

EPA anticipates that it will submit legislation to consolidate all categorical grants currently under seven environmental control programs into a pollution control block grant. We are working closely with our State partners to review and assess this concept. This consolidation should enhance the ability of State policymakers to Administer these programs in an efficient manner and increase State flexibility. Due to the rapid increase in requirements imposed by the 1984 hazardous waste amendments, the hazardous waste program will retain its categorical funding until 1988.

The President's 1987 Budget continues to maintain our commitment to the Chesapeake Bay and Great Lakes Programs. We propose to continue Federal support in this, the third year of the cleanup program for the Chesapeake Bay at the $10 million level. This $10 million of EPA support is designed to help the Bay States primarily through costsharing grants, while continuing EPA's role in monitoring and modeling. We also propose $5.7 million for the Great Lakes Program. In addition, our budget request maintains support for the Estuarine Program for water quality management in four important coastal water bodies. In 1987, two additional new estuarine initiatives will be selected on the basis of national environmental priorities.

For our largest grant program, construction grants, the President will submit an amended request for $1.8 billion after appropriate reform legislation is enacted. The Agency continues to support the Administration's reauthorization proposal to phase out funding for the program by 1990 and limit funding to existing projects that have previously received Federal funds, that is, to forego funding for additional new starts.

Controlling Emissions of Hazardous Air Pollutants

In 1987 EPA will continue to place the highest priority in implementing a comprehensive national air toxics strategy. Consistent with the national strategy and guidance, State and local programs will be eligible for assistance to enhance capabilities to address multi-source pollutants in specific geographic areas.

These are some of the highlights from our 1987 budget request. I am very pleased by the outcome of this first stage of the budget process. We at EPA should feel good about the Administration's commitment to our mission, even in times of government-wide budget reductions. I believe this is a strong budget, -- one that will provide EPA with the resources we need to continue protecting human health and the environment.

Senator GARN. Thank you very much, Mr. Thomas.

Although this hearing is on your 1987 request, your biggest problem is overhanging 1986 issues. Congress, as you well know, only provided partial funding for construction grants pending enactment of the clean water authorization bill. The Superfund Program, as you mentioned, has an April 1 "drop dead" point in terms of exhausting funds for field work unless the authorization legislation is enacted.

What is your reading as far as the conference deliberations at this point?

Mr. THOMAS. On Superfund, the conference has been proceeding over the last couple of weeks. Frankly, I have been disappointed with the pace. They cancelled the session yesterday. They had set up an agenda, I thought, last week.

Senator LAUTENBERG. We are moving along at a dead stop, Mr. Chairman.

Mr. THOMAS. Senator Lautenberg is more frank than I am, but I am very concerned, and Senator Lautenberg and others and I have talked about it. We literally are bringing that program back to where it was in 1981 and 1982.

We as an agency, and you as a Congress, have spent hundreds of hours talking about where it was in 1981 and 1982 and how we established momentum in that program in 1983, 1984, and 1985. If we are not careful in the next month, the program is going to go right back to where it was, and it is going to take us 1 to 2 years to get it back up to speed. There is no question about it.

Senator GARN. I am sure you understand our frustration as an appropriations committee. We can't move without an authorization. I think this subcommittee is willing to move ahead. I have indicated that to you before. I, frankly, don't understand, with the April 1 "drop dead" date, why they are not moving. I am obviously not on the authorization committee, but whatever they do, I don't understand all the time that has expired without their coming to some kind of an agreement, whether it is something that we like or don't like.

My question is, really: Do you have any optimism that they will start moving? Are they going to let April 1 just come and go, or are they going to do something?

Mr. THOMAS. Senator, first I appreciate the action that this committee has taken. For instance, you moved forward, gave us the fiscal year 1986 appropriation of $861 million, and as you say, we cannot go forward without authorization; although you got us an appropriation, it is not available until reauthorization is completed. If the authorization process can't be completed for full 5-year authorization, at least reauthorize the program for a year and let us move ahead with the $861 million that has already been appropriated. That way we can get the program running again while they continue this reauthorization process.

I am not optimistic that they are going to finish by April 1, and I have become less optimistic every day.

Senator GARN. Are they even willing to consider a shorter term extension so that you don't start closing down?

Mr. THOMAS. In a hearing we had the other day, Senator Lautenberg suggested, for instance, the possibility of a 2- or 3-month extension after April 1. I have major problems with just continuing to drag the body along.

I was hoping we could get the 1986 money appropriated to us back into the program so we could get the work going again. Clearly, anything to keep from having to terminate contractors and begin terminating staff is better than nothing.

However, interim funding is a little bit above nothing when we are talking about just continuing to drag this program along week by week and month by month. If, in a short-term extension, we could do more than just exist and put some of that money in there that you appropriated to us, it would be a real boost in the program while the reauthorization process continues.

Senator GARN. I would agree that a year extension would be far better to go ahead and free up that money we have already appropriated, but it seems to me that if you had even a 90-day extension, at least that keeps some pressure on those guys. The bad side of a 1-year extension is that they go a year and they haven't done anything on it, either.

So from a political standpoint, you may be better off with a shorter extension that you can keep going without having to cancel contracts and put some pressure on them to get on with their business, whatever that is.

Mr. THOMAS. It is a very valid point, however, I was opposed, generally, to any kind of short-term extension, because I felt like the pressure for full reauthorization needed to be maintained. Frankly, I have not seen a lot come out of that pressure as far as getting reauthorization finished.

My fear is that if we just go with a short term extension, the pressure doesn't seem to be accomplishing our ultimate goal, which is to get reauthorization finished. However, I understand your point.

Senator GARN. We just wish we could be helpful, but again, as you have stated, we appropriated the money and I don't know what else we can do here except hope there can be some agreement reached. It would be far better if they would just go ahead, no extensions at all, and come up with a new authorization bill, because the problem won't get less; it will become more difficult as you go on.

CONSTRUCTION GRANTS

Let me turn to the construction grants.

We provided $600 million of the $2.4 billion for the Construction Grants Program on the assumption that by April, the authorization for that program would be law and the rest could then be released. What is your current estimate of how rapidly the States are drawing down the $600 million?

Mr. THOMAS. I am going to let Larry Jensen, the Assistant Administrator for Water, respond to that. But overall, our position, as you know, is that we would like to see the additional $1.8 billion this year appropriated as soon as possible. Two aspects of that: One is the grant money that the States need for their projects and their anticipation of that money; and the other is the administrative expenses that the States have in managing the overall Construction Grant Program.

It is a percentage of the amount of money that has been appropriated. So if you have only got the $600 million appropriated, then the amount of money available to the States for administrative expenses is substantially less than they had anticipated this year or we had anticipated. We have got that problem of how do you decrease and increase State staff because of the phasing down of appropriations as well as the literal grant part of the project.

But let me ask Larry to comment on that a little more specifically.

Mr. JENSEN. In terms of the actual drawdown in the grant money, the $600 million, our best information is that some 13 States and 2 territories will have essentially obligated their entire share of that $600 million by the end of this month.

In terms of the administrative expenses, as best we can tell at this point, it would be closer to the end of the fiscal year before any one State would face a situation where they were running out of administrative moneys for purposes of running their program.

Senator GARN. The fact that both the House and Senate have rejected the proposed 4-year phaseout of the Construction Grants Program, does this mean that we should not expect a revised budget request for 1987?

Mr. THOMAS. In the budget request for the Construction Grants Program for 1987, we want to request the $1.8 billion, but we are in the position of trying to wait until reauthorization is concluded. So the revised budget request, again, is pending that reauthorization. I would not anticipate the conference committee on the Clean Water Act really getting down to work until after the Superfund conference is concluded, because you are dealing with basically the same staffs on the House and Senate side.

REVISED OPERATING PLAN

Senator GARN. Last December, as I am sure you remember, Congressman Boland and I wrote you a letter requesting a revised operating plan reflecting the anticipated March 1 Gramm-Rudman-Hollings reductions as well as any reprograms or shift that you would be proposing.

When can we expect the transmittal of that revised plan?

Mr. THOMAS. I believe we sent it up yesterday, Senator.

Senator GARN. Senator Leahy?

ACID RAIN CONTROLS

Senator LEAHY. Thank you, Mr. Chairman.

Mr. Thomas, in the beginning of the meeting, I gave you a copy of a resolution which has been adopted by over 150 town meetings in Vermont last year at this time calling on the administration to actively do something to control acid rain. It came out of a very sincere concern we have in Vermont.

A lot has happened since then. One of the most positive things, I feel, is that you visited Vermont, and you saw first hand why we are so concerned about acid rain, why we think that controls are necessary.

Other things have happened, not, I am not suggesting because of the call in Vermont, but because of the call of a lot of us, both Republicans and Democrats here in the Congress; the special envoys were appointed by President Reagan and Prime Minister Mulroney to Canada to develop an acid rain plan. The newspapers are now reporting that the President's advisors are going to urge him to endorse the special envoy's report.

I know Prime Minister Mulroney is coming here to the United States in about a week, and I hope to talk with him on his own feelings about that. Drew Lewis, our envoy, has stated in that report and other reports that acid rain is a serious problem; it has got to be addressed.

In your own recent testimony, you stated:

> This administration's oppositions to control is not based on a determination that acid rain controls are too expensive but that not enough is known to prescribe a sound set of controls.

The Lewis report, as I read it, takes it in a different point of view. It states, and I quote:

> A significant impediment to the development of a U.S. consensus on acid rain is the high costs of the available control options. Therefore, the U.S. Government should implement a 5-year, $5 billion control technology commercial demonstration program.

It seems that we have got almost opposite views here. It seems that your Agency is saying we can't cut acid rain until we know more, and Mr. Lewis is saying we can't cut acid rain until it costs less. Now, every time we talk about cutting acid rain, we always seem to be usually facing just one hurdle.

Do we now have two hurdles that face us? Do we have a hurdle on one hand saying it costs too much and on the other hand saying it is not that it costs too much, we don't know enough?

Are there really two hurdles out there?

Mr. THOMAS. Senator, I don't believe so. I think the Lewis report, the thrust of their recommendations is not inconsistent with the policy and position that I was talking about in that testimony. We don't know enough yet.

A significant new factor in the Lewis recommendations had to do with the point you made, which was, let's move out with a commercial demonstration program related to clean coal technology.

They went further in that report and acknowledged the major uncertainties associated with acid rain, and the impact of those uncertainties on trying to determine cause-effect relationships and strategies for imposing controls. As a matter of fact, the report recommended an aggressive research program that is similar to the research program that we have underway.

At the same time, however, they recommended that we also ought to move forward and deal with the burning of coal and particularly, the burning of high sulphur coal with a substantial Government assistance effort to try and put in place commercially viable, clean coal technology.

I recognized the cost of that technology by recommending the Government assistance program in implementing it.

I don't see it as two hurdles insofar as his report is concerned. I see what he was saying: that he felt that even though there were major uncertainties, and even though there was a need for a significant research effort to come to grips with those uncertainties, he thought that the kind of coal-burning technology that was currently at a commercial stage needed to be pursued more aggressively with Government assistance than it had been to date.

Senator LEAHY. But understand the concern that I have when I read this. If in the Lewis thing they are saying we know enough to spend $5 billion to develop new technologies to reduce acid rain, it seems almost to me that we then know enough to require private industry to clean up acid rain causing emissions. We may have to go into a question of how we fund that, but if we know enough to ask the Government to spend $5 billion in cleaning up the cause of acid rain, I would think we would know enough to go forward and call upon industry to start taking those steps to clean it up.

Really, my main concern is I see the forest whether in Vermont or the Adirondacks or anywhere else dying, and every year, we hear, "Well, it costs too much," and that is one argument, and if we get over that argument, they say, "Well, we don't know enough about it," and then we go back and say, "We know enough about it but it costs too much."

I wonder if we end up with some of a "now you see it, now you don't" kind of thing, and we keep arguing the reasons back and forth and nothing gets done.

Mr. THOMAS. I don't believe so, Senator, and the difference is between our Targeted Emission Reduction Program and its cost and your ability to: One, determine where reductions need to be made; how much those reductions should be in order to have some impact on another area. I think the cost associated with that as well as our ability to do that is far less than while in the meantime, we are trying to determine if that is needed and if so, where. Let's move forward to develop generally this clean coal technology so that if reductions are necessary in a particular area or generally, we have the technology available to ensure that high-sulphur coal can continue to be a resource and burned with lower emissions.

The cost associated with that, which was a Government-industry match approach, the $2.5 billion Government-$2.5 billion industry, is a substantially different kind of cost than we are talking about when we talk about a Targeted Emission Reduction Program, for instance, that has been embroiled in various legislative proposals, like a 10 or 12 million ton reduction.

LEWIS DAVIS REPORT

Senator LEAHY. At this point, I think people are so concerned that any movement forward is going to at least give us some sense of accomplishment. Do you think the administration will accept the recommendations made by Ambassador Lewis?

Mr. THOMAS. That, as you said, is a major part of the discussions that the President and the Prime Minister are going to have next week. I don't want to prejudge their discussions. The highest item on their agenda is this issue—acid rain. They intend to have a full discussion of it and the Lewis report obviously will be the basis of that discussion.

Within the administration, we have had lengthy discussions on that report in preparation for that meeting.

Senator LEAHY. How do you feel about that report?

Mr. THOMAS. I feel it is a pretty good report.

Senator LEAHY. I tell you what I will do. You keep nudging them down at the White House and I will keep nudging the President about this, and I will even nudge Prime Minister Mulroney, although he doesn't need to listen to me; I don't think he needs a lot of nudging in this regard. But I will keep pushing at the White House, and you keep pushing at the White House, and maybe we will get somewhere.

Senator GARN. Senator D'Amato?

PRESSURE FOR SUPERFUND REAUTHORIZATION

Senator D'AMATO. Thank you, Mr. Chairman.

Mr. Chairman, speaking of nudging, I think there is a very legitimate place for our administrators to be nudging, and that is in the Congress. I am wondering what you are doing in relationship to the problems that have been discussed with Superfund and turning out people who are now working on these projects, terminating contracts, setting the program back years. I think if is absolutely a horrible situation.

Lee, to be quite candid with you, I think you have an obligation to go forward and to prod in a very public way those Members of the Congress, those committees that are not coming forth.

Now, what, if anything, are you doing in that regard?

Mr. THOMAS. Well, I have been trying to do everything I can short of a lambasting national press conference. I understand that may be a suggestion you are making.

Senator D'AMATO. That is where I am going. I venture to say, and I would ask my colleague who is working on this, that I know there is no one who has greater concern than Senator Lautenberg on this. He may think that it may be appropriate to stimulate the committees to get to work.

What do you think about that, Frank?

Senator LAUTENBERG. We need as much help as we can get. I don't want to interpret Lee's strategy on this. But I think there was a point at which wishing may have overtaken some of the keen analytical judgment that the Administrator has. The ball got away from us in this game, and we thought we would be further along than we are now. We are at the point where there is a real red flag up there. I think Lee, this morning, made the case more urgently than I have ever heard, frankly. And the chairman's view on this was very helpful. A 1-year extension for Superfund would not be helpful. A shorter term extension is essential.

We need to get going. Right now, it looks like the conference, frankly, is moving only slightly faster than a stalemate.

Senator D'AMATO. That being the case, Mr. Thomas, and I thank my colleague, Senator Lautenberg, for his candor on this subject, I would like to suggest something to you. I say this with all due respect and you may not make some friends up on the Hill, but I think you might set forth the record by way of a national conference, a national press conference to set out exactly what is going to take place and how far back these programs are going to be. I think it is intolerable.

Mr. THOMAS. Senator, let me say that as far as doing that, probably the best forum for doing that was the hearing of about a month ago that was covered by the national press before the Senate Environment and Public Works Committee where, with charts blazing and the whole world looking, I laid out how the program was going to be absolutely devastated and the time lines for doing that.

Additionally, in letters to every Member of Congress, press briefings, and hearings that the conference committee has now started holding, I have constantly reiterated the theme, and for whatever reason, we find ourselves in this position.

That is why I said I was a believer that the pressure would bring us a reauthorization up until about a month ago, when I found that the primary person feeling the pressure was me.

Senator D'AMATO. Sure.

Mr. THOMAS. And there didn't seem to be anybody else feeling it.

Senator D'AMATO. Can I suggest this to you? If you think the American public knows that it is the committees and the staffs who are entangled in this stalemate and pride of authorship and a lot of ego—and I am not going to say where, what goes into the stalemate—you are wrong, and they are going to blame you and the administration.

So it seems to me that what will get this program going is you coming up front and suggesting a course of action, suggesting a position and putting the plan before Congress and saying, "If the Congress doesn't act, this is what is going to happen." Then the ball is in the Congress' court. Let Congress know. Let them know, specifically. Let them know what committee, and call upon the American public.

Let them know what the consequences will be.

You had that meeting a month ago with the charts blazing. Believe me, nobody remembers it. It has been forgotten. A couple of staffers attended, along with some other people—the inside players—but it seems to me that this is the only way it is going to happen, and failing that, I have to suggest to you that, No. 1, the onus will be placed upon you.

The blame, culpability, et cetera, will rightfully or wrongfully fall upon EPA, because you are not going to be able to explain to the American public; and second, what is more tragic than assessing who is right or who is wrong is that these programs will be terminated. To get that ball rolling again, as you have expressed to the chairman of the committee, it is going to take an inordinate period of time, and that is terrible.

So I think you have the obligation, as well as the right and the responsibility. You have the right to get up there and do a little bit of finger pointing and to say, "Fellows, we may not be perfect, but what you, the committees, are doing is a terrible disservice to the people of this country."

This is not the big spending committee, but the moneys are there. The chair and the ranking members have made it clear that they are there to undertake this work. I would hope that you would focus in on that. You may have to go back, talk to the administration, but may not be in favor of that. You have got that obligation. I leave it with you as a suggestion.

I have a number of questions for the record, Mr. Chairman, and I would like to submit them for the record and hope that you would respond.

Mr. THOMAS. Yes, we will provide the information for the record.

Senator D'AMATO. Thank you, Mr. Chairman.

Senator GARN. Senator Lautenberg?

SUPERFUND SHUTDOWN

Senator LAUTENBERG. Thanks, Mr. Chairman.

Lee, as usual, it is good to see you and the gang of 20. As you know, I think that EPA's budget proposal is inadequate. A clear analysis of the figures shows that the operating budget is $400 million below the 1981 level in real dollars. But right now, I would like to concentrate on the Superfund and construction grants programs, both of which you have certainly established today have urgent funding needs.

Superfund has reached a critical point, despite efforts to move the reauthorization conference forward. Progress has been slow, and the conference was canceled yesterday. It is the middle of March.

Unless we get action on either a full 5-year reauthorization or an interim funding plan, you have started the wheels for dismantling the program, and frankly, that ought not to happen.

I would like to point out to the chairman and my colleagues, the ranking member, Senator Leahy, on this committee that the Superfund Program is very complicated and has an extensive infrastructure, staffed by scientists and researchers and engineers. Superfund contractors are not easy to come by. They have their own organizational needs. You don't stop a ship of this size and just restart it again by the push of a button.

So, facing the April 1 deadline, I have pressed the conferees to pursue a dual track: One is to move as quickly as we can on the conference, but the second is to provide stopgap funding, if necessary.

I intend to reintroduce or introduce a short-term extension of funding for Superfund next week, and if that bill is enacted, it is going to provide enough funding, hopefully, to delay the shutdown of the program, but not too much to take the pressure off the conference.

I want to say to my colleague from New York, though the shoe is tight on our feet, it really is, there is no one on either side of this table that is free of blame. The fact of the matter is that the proposal sent down by the administration for the total funding of Superfund is inadequate.

The Senate enacted, overwhelmingly, a Superfund reauthorization of $7.5 billion, overwhelmingly. The House came back with a $10 billion reauthorization program.

So when the President says $5 billion, it obviously falls short of either House's desire. That is where we start our problem, I think. Had there been the support initially for a funding level for Superfund of the magnitude necessary to really get this thing moving, I think reauthorization of the program would have moved along much more quickly.

So while Lee, now, as the skipper of the ship, is sounding the alarm and calling all hands to deck, the fact of the matter is that there was a period of time when the administration was more concerned with budget balancing than a strengthened and effective program.

I hope that we can all get together to get this moving.

I understand you began the first phase of the shutdown last month, Lee. Is that true?

Mr. THOMAS. We began the steps, Senator, that we talked about last month. We have begun the personnel processes in the Agency, which are developing the procedures and the training programs that would be required to take furlough action for a reduction in force. To phase in these actions by October, we have to begin those actions now.

We would begin the actual instructions to our managers in March and April. We would begin contacting those employees responsible for preparing our RIF registers in May. As far as contractors are concerned, we have sent letters to all of our major contractors notifying them of the possibility of termination, and we have begun to identify which contracts would be terminated.

These are prime contracts. Obviously, they impact subcontracts. We are beginning to identify which contracts would be terminated during the April to October time frame, and they would be phased out during that period of time.

Senator LAUTENBERG. You know what their reaction is already, I think, in many cases.

Mr. THOMAS. I saw a copy of a letter they sent to all conferees that said they were planning on laying off 2,500 employees.

Senator LAUTENBERG. The letter was from a group of major contractors.

Mr. THOMAS. These are all the major contractors.

Senator LAUTENBERG. That is a very severe problem. When you restart the program and contractors have to find people, it is going to be very difficult.

Mr. THOMAS. Senator, if you terminate a contract, you are talking a minimum of a year to get a contract back in place because of Federal procurement requirements.

When I terminate those contracts, it is not a light decision. It is a decision that in making is going to leave a hole in that program for at least a year. It is the last thing I want to do.

The next thing I am doing is looking at how I will stop work on the existing projects, the 350 Superfund sites where I have existing work underway. I will look at stopping work on these projects and whether I can recoup some of the money from those projects that is unliquidated; it is obligated but it is unliquidated. I am asking whether I can put a stop-work order on those projects?

I am looking at putting out letters to the States in the next 10 days to begin looking at that process.

TERMINATING SUPERFUND CONTRACTS

Senator LAUTENBERG. Are there any penalties for cancellation?

Mr. THOMAS. There are penalties for cancellation of a contract, so we look at, how much it cost us to cancel versus how much it cost us to run at a minimum.

Senator LAUTENBERG. To limp along.

Mr. THOMAS. Exactly, so we look at things like what is the minimum in a contract that you have to maintain. Can we go with a stop-work order for a short period of time instead of a termination? All of that kind of analysis has been underway for several months, and the staff has been working on that as we get close to the point where we have to make that decision.

Senator LAUTENBERG. What has significant costs in terms of time and money, in terms of tying people up.

Mr. THOMAS. It is tying up staff's time, when staff ought to be out there working and making sure we are cleaning up sites.

UNOBLIGATED SUPERFUND BALANCES

Senator LAUTENBERG. What is the current unobligated balance in Superfund?

Mr. THOMAS. Win Porter, who manages the Superfund Program, can respond.

Mr. PORTER. We have approximately $120 million left. We had put aside about $100 million at the beginning of this fiscal year to take care of salaries and expenses for the EPA's staff.

I would like to add to one of the things Lee said. One of the effects I am seeing, is that even on the projects that are ongoing, and particularly on the emergency removals, we are having a hard time getting people to obligate funds because they are in the mode of trying to save money. We are all trying to hang onto money. It is not only the things Lee is talking about in the future, but it is the programs right now, almost inadvertently. I am having to whip people pretty hard to keep doing what they are doing. It is hard to hang on to money.

Mr. THOMAS. We are also beginning to lose staff. Contractors and our people are leaving. People see jobs come up and they leave; they take the stable job instead of the 3 weeks they see here.

Senator LAUTENBERG. I agree. I don't want to be the gloom forecaster, but as I said at our Environmental and Public Works hearing on EPA, I wouldn't be surprised if EPA staff packed their bags and got out of there. There are a lot of conscientious and hard-working people at EPA. But they have personal responsibilities and needs, and you cannot ask people to sit by and wait for the ax to fall one day, when, in fact, they may be competing with their neighbors for the same darn job.

Senator LEAHY. We have already heard from a company in Vermont where they are going to have to start closing down.

Mr. THOMAS. For the contractors, I think, it is more dramatic than for our own staff right now, because they are looking at possible terminations very soon, so their staff is beginning to look at other positions. We are getting feedback from contractors that they are having problems with staff retention.

Senator LAUTENBERG. We are at a really critical stage, and "Can you hang on for a few more weeks" is a heck of a way to run an organization. But, can you hang on for a couple of more weeks in terms of delaying any conclusive notice to contractors or employees? Is there anything that we can do to show the flag a little bit; to say, "People, listen, this is getting serious attention"?

I think Senator D'Amato was correct. When the public realizes how serious this problem is, the conferees will feel more pressure. New Jersey has a very enlightened public on the issue of toxic waste cleanups because we have so many toxic waste sites on the priorities list.

Mr. THOMAS. We will continue in the process of getting ready for shutdown, but the terminations, as I said before, won't start until after April 1 as it relates to contractors. So when you say: Can we hang on a few more weeks, yes. But we are looking at right around April 1, starting the process of actually taking the action that is necessary. Now, we are trying to stretch that out as far as we can, and I am going to stretch it out as far as we can.

Senator LAUTENBERG. You know, we have a recess coming up. My time is up, and I will just take a minute more, Mr. Chairman, if I might. We face a recess that first week in April. It is just a terrible time to have to deal with a problem that has this kind of urgency attached to it.

I hope that I am going to be able to get the help of EPA, Lee, in getting this interim funding request going. I disagree that it should be for a year. And I think the chairman said that, as well: Try to hold that organization intact with a message from you that says, "Look, I have the commitment of the Congress to renew this program." Hopefully, you will be able to bring the commitment of the administration a little more clearly into focus, that we are going to hang on to this Superfund; that it is going to be an active, functioning organization; that your jobs will be secure; and that contractors should have some indulgence.

It is not reasonable for contractors to lose money on your account, but you must try to hold this ship together until we weather this storm.

Thank you, Mr. Chairman.

GREAT BASIN DESERT ECOSYSTEM

Senator GARN. Mr. Thomas, let me shift gears. Obviously, Superfund is your most critical fund timewise. Let me touch on a few issues.

Last year, the committee ordered EPA to develop a comprehensive interdisciplinary research program on desert ecology using the Great Basin of Utah, Nevada, Idaho, and Oregon as a model for the significant impacts of environmental pollution and other human use disturbance.

What has EPA done to implement that directive?

Mr. THOMAS. Senator, let me ask Donald Ehreth, who is our Acting Assistant Administrator for Research and Development, to respond.

Mr. EHRETH. Senator, we commissioned a study to develop a plan regarding the scope of that particular activity, the type of activities that might be conducted in such a center, and that should be starting directly. We have allocated approximately $60,000 to $80,000 in this fiscal year to develop that plan.

Senator GARN. Thank you.

Mr. EHRETH. You are certainly welcome.

DELEGATION OF FEDERAL WATER PROGRAM

Senator GARN. Much of the Federal effort in water pollution abatement has been delegated to State control. Within Federal guidelines, 30 States have delegations and 49 States manage the Construction Grants Program. If Federal guidelines and deadlines remain unaffected when Federal assistance is cut, are you concerned about State turnbacks of these delegations to total Federal administration responsibility?

Mr. THOMAS. Senator, I think that is a concern with some States. I don't think the majority of States would turn the program back. I think that States view the responsibility to manage those programs as primarily a State responsibility, as do we. I think they would want to exercise that responsibility.

But clearly, in some States, the funding issue is of major concern, as the States look at that responsibility.

TIJUANA, MEXICO, SEWAGE TREATMENT

Senator GARN. As you are well aware, for the last 2 years, this subcommittee has been requested, under a lot of pressure, as a matter of fact, to consider solutions to the problem of untreated sewage originating in Tijuana flowing downhill and northward into San Diego. We appropriated $5 million in the fiscal year 1984 supplemental for a facility to address that issue.

Last year, we were told that good progress was being made by the Government of Mexico to do something about that problem. Since that time, however, we have had the Mexico City earthquake; we have had lots of other problems; particularly the decline of oil prices in Mexico, and this certainly raises the question over Mexico's financial abilities or willingness to undertake some solutions to that problem. So how is that situation proceeding?

Mr. THOMAS. Senator, I will ask Fitzhugh Green, who is our Associate Administrator for International Affairs, to respond. He has been the individual in the Agency who has directly negotiated the agreements with Mexico, both water, as well as air.

Fitz?

Mr. GREEN. We are talking about faith here, Senator. We negotiated a year and a half ago answers to the questions that have long bedeviled the people in San Diego. At that time, Mexico firmly committed itself to a two-stage sewage treatment program on its side of the border.

Under the first stage, Tijuana's current sewage load of 18 million gallons per day will be pumped west to the coast and then 5 miles south of the border for treatment before it is discharged to the ocean.

The second stage will provide treatment for additional wastewater generated as a result of new water supplies from the Colorado River. It will include a second sewage treatment plant on the east side of Tijuana.

Mexico is now proceeding with the first stage of this plan which, when completed, should take care of about 34 million gallons of sewage a day, Tijuana's projected sewage load into the 1990's. So far, progress on the work has been pretty good.

We are not happy with what they are planning to do for stage two, which is discharge secondarily-treated effluent into the Tijuana River where it would flow into the United States through the Tijuana National Estuarine Sanctuary and out into the Pacific Ocean near Imperial Beach and spreading its effluent on up to Coronado.

The question of the $5 million at this point is a little bit moot, because the appropriation doesn't give us enough money for a fail-safe program. Yet the San Diegans, who are in town today, want to be sure we don't lose that money.

Senator GARN. It lapses in October.

Mr. GREEN. So the San Diegans' current suggestion, I believe, which they are going to make to us today and tomorrow, is that EPA turn this money over to the International Boundary Water Commission so that the Commission can begin some studies on what our first move should be. That $5 million can be released by the administration if the President is satisfied that Mexico has made a good-faith effort to go ahead with its plans. We don't think the administration will have trouble making that determination. There apparently is no way to hold that $5 million for another year.

Probably the best thing to do is to release the $5 million to the International Boundary Water Commission.

Senator GARN. That is going to be your recommendation that the President do that?

Mr. GREEN. Well, I have to check with the Administrator, but I think that it probably will be.

Senator GARN. The reason I ask is, I am aware of the problem, and as you know, we work with State and all sorts of people trying to get the Mexicans to take care of their problem and not cost a lot of money with all the difficulties we have got within our own country with all the limited resources.

But it raises a red flag when you start talking to me about turning $5 million over to studies.

Mr. GREEN. Exactly.

Senator GARN. I want to treat sewage.

Mr. GREEN. That is what we want to do. It would be better management to leave the $5 million out of the picture. I don't know how much the Senator from California——

Senator GARN. We could probably balance the budget if we could retrieve in studies from this Government what never turn into anything but something sitting on somebody's shelf.

So that raises a real red flag when you start telling me that we can turn it over for $5 million to study the problem. I think we have outlined the problem: Thirteen million gallons of sewage flowing north into San Diego. I don't think we need to spend $5 million to figure out the problem. We ought to start putting more pressure on Mexico to start cleaning up their own sewage problem.

Mr. GREEN. I have been watching this off and on for 15 years. The Mexicans have kept faith with us so far. We have no reason to believe they will not continue to do so.

Senator GARN. Let's assume they do. I am still concerned with what we are going to do about $5 million.

Mr. GREEN. It is a good question. I don't think we have a good answer on it.

Senator GARN. That is why I kept pestering you, because I wasn't getting a good answer on what we going to do with the $5 million.

Mr. THOMAS. Senator, we will have one on where it ought to go other than where we are putting it right now. With what we are doing on bids, I assure you, we will have a good answer. It won't be just on studies.

Senator GARN. Before you get too far downstream, would you let the good Senator have an answer on this. I recognize $5 million isn't a large amount in what we are dealing with, but I am still a country kid in that $5 million still impresses me.

Mr. THOMAS. Me, too, Senator.

Senator LEAHY. It impresses me.

Senator LAUTENBERG. Even me.

Senator LEAHY. He is the only one that has $5 million. [Laughter.]

[The information follows:]

STATUS OF $5 MILLION APPROPRIATION

In August 1984, Congress appropriated $5 million to EPA for planning and design of a binational treatment plant on the border to protect San Diego from Tijuana sewage flows. (The language has since been amended to provide for "treatment works"). Congress also authorized an additional $27 million to be appropriated in the future for construction.

EPA and the United States section of the International Boundary and Water Commission [IBWC] have agreed that the IBWC would be the logical agency to assume responsibility for construction of such treatment works. Accordingly, EPA has agreed to transfer the $5 million to the IBWC as soon as the U.S. Government—EPA, the Department of State, the IBWC, the city of San Diego, and the State of California—has agreed on a proposed solution to the Tijuana sanitation problem. The $5 million will not be used for further studies, but for planning and design of the treatment plant.

CLEAN LAKES PROGRAM

Senator GARN. In light of the continuing concern over the degradation of the water quality of our lakes and increasing survey evidence of this decline, why is EPA proposing termination of the Clean Lakes Program?

Mr. THOMAS. Senator, the Clean Lakes Program was originally funded as a demonstration program. We feel that it has demonstrated the potential for action in cleaning lakes and it is a program that we feel the States and localities are prepared to assume where required.

We have recommended that it be terminated as a Federal assistance effort. I would say that in other parts of our budget, there are continued demonstration programs that are similar to clean lakes, such as our Bays Program. We think the Clean Lakes Program itself has proved its worth and is not a program that we at a Federal level should continue to provide.

NONPOINT SOURCE PROGRAMS

Senator GARN. What activities are proposed for section 208 nonpoint source pollution abatement in your fiscal year 1987 budget request?

Mr. THOMAS. There is a small effort for nonpoint source programs in the 1987 budget. Overall, the Agency developed a nonpoint source strategy last year, not just for EPA, but for all Federal agencies.

Our efforts will be directed toward implementing that strategy, which is largely a technical support, technical assistance program for the nonpoint source problem, working with States and other Federal agencies as States seek to implement nonpoint source.

Beyond that coordination and technical support effort, we have a number of pilot efforts incorporated in projects like our bays project and our Great Lakes Program, which are pilot efforts on nonpoint source control, particularly cost-sharing programs with States or modification of farming practices for nonpoint source controls. So we have got efforts in both categories for nonpoint source.

Senator GARN. Thank you, Mr. Thomas.

Senator Leahy?

SHORT-TERM SUPERFUND EXTENSION

Senator LEAHY. Thank you, Mr. Chairman.

Mr. Thomas, if we pass a bill appropriating $70 million as a short-term extension of Superfund, would you recommend to the President that he sign it?

Mr. THOMAS. I don't know, Senator. I would really have to take a hard look at that. I think that I would be faced with a very difficult dilemma, as I have been all along on this program. I certainly don't want to terminate contracts, so I would be faced with $70 million is better than nothing. The alternative to that that I think you have got is far better, and that is, to give me a substantial amount of money that you appropriate so I can get the program back up to speed, and I think you have got the option to do that.

LAND DISPOSAL REGULATIONS

Senator LEAHY. Thank you.

You propose a series of new regulations called the land disposal regulations. One of the problems I have with them, and I bring it to your attention, on page I–635 of the regulations, it states that, " * * * would like to implement these regulations so that in areas with low populations, EPA would consider raising the permissable levels of toxicity by a thousands times."

Is this a proposal that is saying there could be a higher risk in a rural area than in an urban area?

Mr. THOMAS. Senator, let me ask Dr. Porter to comment on that proposed regulation. I would say overall, that the regulation is a proposal; it has been out for public comment. There are several alternatives in the regulation that we are asking comment on. We feel like it is a good, strong regulation consistent with the authority that we were given by Congress to propose that.

We have had a number of public meetings; we have received a lot of comments, some positive and some negative. They have ranged from one congressional staffer who said it was blatently illegal, to others who said they felt it was a strong proposal, so it is certainly a spectrum of comments.

Senator LEAHY. You want to pay a lot of attention when congressional staffers say that, because you understand that we Senators are merely constitutional impediments to the staff. [Laughter.]

They are truly the ones who run things.

Mr. THOMAS. We pay close attention to both staff and Members, Senator.

Senator LEAHY. I do want to hear his answer, but just so you understand why I am concerned, as I read the proposal, and I understand that it is simply a proposal at this point, but it says, "The agency would prefer to allow higher levels in rural areas."

I don't think you would be the least bit surprised to know when I come from probably the most rural State in the Nation, I am very, very concerned about that. I don't want to see one safety level for rural areas and a different one for urban areas. If these hazardous wastes are unsafe to dispose of, they are unsafe to dispose of either in an urban area or a rural area, and we have an awful lot of rural areas where people are just as concerned about safety as in urban areas.

Mr. THOMAS. I agree, Senator. The standard that we have to meet for that proposal is protection of the public health and environment. Nothing within the proposal does not meet that standard, whether it applies to rural or urban areas.

Win?

Mr. PORTER. Let me just pick up on that point if I can, Senator.

Senator LEAHY. Sure.

Mr. PORTER. That is exactly the point of the proposal, to protect the public health and environment. What we are saying is that we are looking at affected populations and contamination levels while protecting the public health and environment. I think it can be worded to make this point more evident because it is a proposal. I think we need to look at that kind of wording. Unsafe disposal levels are really not very accurate in terms of what we are trying to do.

What we are trying to do is look at the total population impacted by these proposed regulations and then try to look at what concentration levels are protective, and that is what I would like people to focus on. If you look at solvents and dioxins, which is in the first list we proposed, do people think the levels for solvents and dioxins are fully protective of the health and environment? I think when you look at it in that context, they are.

Senator LEAHY. Let me make this suggestion: When you go into the rural areas, when you go into the question of what you may be able to dump or not dump in rural areas, spend some time, have the staff come and sit down and spend some time with me. I have some very real concerns about that. I am not going to suggest I have all the expertise in my office by any means. But I do have some concern about rural areas, and I would like to be involved in that.

I realize these are simply proposals. I am glad you are making them as proposals, but let me give you some ideas about rural America.

Mr. PORTER. We definitely will, Senator. One thing we said in this proposal about safety levels is it is about the most important one under RCRA. We certainly need all the input we can get. We will be glad to talk to you.

HAZARDOUS WASTE ENFORCEMENT

Senator LEAHY. There is one other thing. About 3 years ago, there was a GAO report, and it found widespread violations of hazardous waste laws. So in a consequent report, I asked the EPA to prepare enforcement strategy, probably to be sure that the 65-percent violation rate stopped, which is what GAO found 3 years ago. It was a 65-percent violation rate, and eventually it got to a compliance rate of at least 90 percent. Now, GAO evaluated that strategy. They found that it could work; you could get to the 90 percent, but they have also found that the States have never been told that EPA's goal is now 90-percent compliance.

Can we get that communicated back to the States?

Mr. THOMAS. Win?

Mr. PORTER. We certainly can. That is what we are shooting for, you are absolutely right. What I need to do—and we are working on it very hard—is to be sure that people understand that. What we have, Senator, right now is a little bit of a new ball game in that on November 8 of this last year, we had a lot of people close who were the universe of land disposal facilities. We now have a good handle on the needs of both those 500 people that want to get a permit and of those thousands that have to close.

We have three or four initiatives underway which I think will be very helpful. First, I just received a report from the Ground Water Task Force which had a lot of recommendations on how to be more effective in our enforcement and our training of RCRA personnel.

I am going to make a decision in early April about how to implement each of those recommendations. The second thing we have done is we are inspecting every land disposal facility every year. We have set that as a goal for ourselves and for the States and we are on a track to look at them every year.

Third, we are on the point of taking timely enforcement action within 130 days of any violation we find. We are not there yet, but we are pushing very, very hard, and we will be sure they understand the importance of timely enforcement.

Senator LEAHY. Please do that. I will just give you as a personal experience, I spent nearly 9 years as a prosecutor, and I found that matters in prosecuting, the law enforcement agencies that had to respond to me responded best when I gave them a very, very clear signal that I expected enforcement.

It is the same in our environmental laws. I think if EPA says that we will enforce these laws, we expect them to be enforced, that is going to be our standard straight across the country, then they will be enforced.

A lot of people will be very supportive of that, because there are a lot of people who are going to try to foil the law no matter what, to be concerned that others don't, and nothing happens. Give the message strong and clear. I think an awful lot of people are going to fall right in line.

Mr. THOMAS. Senator, let me just say that the concept of a strong, consistent enforcement strategy is a major component of my management approach in the hazardous waste area. We have had that as a high priority over the last several years. One of the things we have done to try to ensure that both the States and the EPA were implementing it consistently across the country is to negotiate between EPA and every State a consistent, timely, and appropriate enforcement agreement for the Hazardous Waste Program so that every State is implementing the same criteria. These criteria include how often we do inspections, what kind of enforcement action is required when we see a violation as far as its appropriateness, the timeframe within which that enforcement action should be reconciled, criteria to identify when EPA will take action if a State doesn't take action, and when EPA will overfile if the State doesn't take action.

Additionally, during that timeframe, we expanded our Criminal Enforcement Program substantially, with a major emphasis on hazardous waste. I think that we have made a lot of progress during the last 3 years. We have talked a lot about a strong enforcement effort, and I think that we see substantial improvement. That is not to say, as Win said, that we don't have a ways to go. I think the message is of a strong enforcement program and the message of a consistent State-Federal effort is one that has been very clear and consistent over the last 3 years.

Senator LEAHY. Mr. Thomas, I applaud you on that. I think that the message is getting out there and just has to be consistent. One of your predecessors—I won't have to go into her name here—but one of your predecessors had an entirely different attitude about that, and I found the study that I made that she was actually reorganizing the Enforcement Division over and over and over again, and that is a clear signal that there wasn't going to be anybody there to enforce; sort of, "Go ahead and pollute, we don't give a hoot."

That has to change, because the vast bulk of Americans, I am sure you know, want environmental laws enforced. The message has to be strong and clear, and I applaud you for doing it.

Mr. Chairman, I am going to have a number of questions for the record which can be just submitted to Mr. Thomas and his staff, and I appreciate his testimony today. I am glad to see somebody as competent as yourself there. I know these are difficult times. I know some of them are political; some of them are financial, but I think you will find a lot of support in this committee for this on both sides of the aisle in trying to help you carry out the mission you have.

Mr. THOMAS. Thank you, Senator.

Senator GARN. Senator Lautenberg.

Senator LAUTENBERG. I would like to stop giving you compliments, Lee, and start giving you money.

Mr. THOMAS. Senator, we would be glad for both. [Laughter.]

SUPERFUND SHUTDOWN—IMPACT ON CONTRACTORS

Senator LAUTENBERG. I again associate myself with the remarks of Senator Leahy on Superfund. In cooperation with the chairman, I hope it will be possible to get a direct appropriation for Superfund for an interim period, and at least keep the program's organization intact.

I will submit for the record, Mr. Chairman, a letter from the law firm that is representing this group of contractors that very clearly spells out the problems they are going to face if we do not do something.

[The information follows:]

LETTER FROM WILLIAM N. HEDEMAN, JR., BEVERIDGE & DIAMOND, P.C., WASHINGTON, DC

March 7, 1986

The Honorable Frank Lautenberg
717 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Lautenberg:

This letter is being written on behalf of 23 companies, listed below, who represent the vast majority of the contractors performing investigations, studies, design, laboratory analysis and clean-up work for the Environmental Protection Agency in support of the Superfund program. We also write on behalf of hundreds of others, including small and disadvantaged businesses, who are employed by us on a regular basis through subcontracts to perform a variety of different tasks, often complex and dangerous, in support of this vital program.

We want you to know our position with respect to the reauthorization of the Superfund program and to understand clearly the impact that will occur to this program if this action does not occur immediately. **WE ARE ASKING THAT YOU ASSERT EVERY POSSIBLE PERSONAL EFFORT TO GET SUPERFUND REAUTHORIZED WITHIN THE NEXT 30 DAYS FOR A FULL FIVE-YEAR TERM WITH SUFFICIENT RESOURCES TO, AT A MINIMUM, MAINTAIN THE MOMENTUM THAT THIS PROGRAM HAS ACHIEVED TO DATE.**

The Superfund program is vitally important to this nation and its commitment to protect the public health of the American people. We share with you that commitment. It has influenced our individual decisions to become involved in this field of endeavor. Working together with EPA, we have built a solid, national response infrastructure now located in all 50 states and the territories that can rid this nation of the hazardous waste legacy that originally prompted enactment of the Superfund legislation.

Our employees work daily with EPA and the states to respond to thousands of uncontrolled hazardous waste sites and chemical spills that threaten the nation's public health. We know from this first-hand experience what the public expects Superfund to accomplish. The complexity of the problems that we have encountered have stretched our ingenuity. Over the last five years, we have assembled a cadré of expertise that can effectively respond to these problems and achieve the public's expectation for the future success of the Superfund program.

Based on EPA's announced intention to "shutdown" the Superfund program, we will shortly face the prospect of having to terminate at least 2500 employees. They represent individuals with a variety of highly skilled qualifications, not easily found in the employment market, who are required to work in extremely adverse conditions. Despite these demands, employee turnover is very small. These employees need to be encouraged to stay in this field. The nation needs them, their commitment, and the skills they have developed in this new field. The low morale that they feel as a result of the uncertainty of reauthorization is rampant. Many of our best employees already have begun looking for other jobs. We need your help in giving them the encouragement they need to stay in a field that guarantees a career. A five-year reauthorization of Superfund will do that.

We are encouraged that the Superfund Conference has begun. The issues that you have confronted in your individual Committee have been enormous, and you have worked diligently through the legislative process to establish positions on those issues. Time is now of the essence. The issues are numerous; the time to resolve them before major disruptions to this vital national program occur is very limited. We need your support to continue work toward resolving these issues as quickly as possible so that the progress that we have achieved to date will not be lost.

What is the disruption that may occur if your Conference fails to resolve quickly the remaining issues? Based on our collective experience in this program and data already provided to you by EPA, we want to briefly highlight these impacts, as we see them. We have provided an attachment to this letter that describes them in greater detail. The impacts are the following:

- Inability to begin or continue scheduled study or design work at 440 sites on the National Priority List (over 50 percent of all of the NPL sites listed so far) and the resultant months, if not years, of delay that will occur at these sites until remedies can be selected and implemented.

- Loss of an entire, critical construction season that may affect 46 sites on the National Priority List for which construction work already is ongoing or has been scheduled.

- Loss of our key employees and the investment that we have made to recruit and train them for this highly specialized work.

- Loss of credibility in the Superfund program by the public and others who rely on the expertise of our companies to reach decisions.

- Loss of the national response mechanism that has been built up over the last five years to respond to immediate threats to public health caused by transportation spills of chemicals, air releases of hazardous substances, abandoned hazardous waste sites, and the like.

- Disruption and possible total loss of the momentum that has been built up in the Superfund program at a time when the public is demanding greater acceleration of the program.

- Elimination of many small and disadvantaged businesses which are currently participating in the Superfund program by providing services such as well-drilling, soil sampling, air monitoring, laboratory analysis, equipment purchase and rental, and clean-up services.

- Slowdown of clean-ups underway or planned by other federal agencies and the private sector on other National Priority List sites.

- Loss of the five-year investment to achieve an effective national clean-up machinery, and incurrence of unnecessary "non-clean-up" costs associated with contact termination, including the costs for demobilization and subsequent reprocurement of new contracts.

Some may suggest that we exaggerate the situation and that all we need to do is to temporarily transfer employees to other jobs being performed by our companies until reauthorization ultimately occurs. Most of us do not have this luxury, as these jobs already are filled or other work simply does not exist. To the extent that we may have that opportunity by virtue of doing similar work for the private sector, we believe that "conflict of interest" issues would arise if those employees were later considered for reassignment back to EPA/Superfund contracts.

We are aware that members of Congress requested the Environmental Protection Agency to transmit to Congress draft legislation to reauthorize the Superfund program for one-year at $861 million. At this point in time, with the conferees assembled and the discussions on a five-year reauthorization underway, we urge you to focus your efforts on the Conference and a five-year reauthorization, rather than on a one-year interim reauthorization. The program needs stability. It needs the national affirmation of a long-term commitment. We also need this long-term commitment to best serve this effort.

Should you determine, however, that an interim reauthorization of less than five years is appropriate, we urge that you proceed in a manner that would maintain the program's planned commitments for at least one full year. Alternatives to a one-year interim funding such as $70 million and $140 million interim fundings that some Congressional staff have suggested to EPA would not be an acceptable solution. They would breed even more disruption, do nothing to mitigate the impacts described in this letter, taint the program with continued uncertainty, and remove the impetus to give Superfund a future.

In summary, it is ironic and tragic that the infrastructure that will be needed to support a much larger Superfund program is being allowed to disintegrate. The pace of Superfund activities since 1980 primarily has been controlled by the rate at which private industry would and could respond with resources and capabilities. The contracting community has responded based on the expectation of a reliable, long-term supply of work. The uncertainty created by the long reauthorization process and the imminent halt to site clean-up activities will severely damage the credibility of the entire Superfund program.

We have retained Mr. William Hedeman, who directed the Superfund program at EPA for four years, to act as our spokesperson. He and members of our coalition will seek a meeting with you in the near future to provide greater details on our concerns and respond to any questions you may have. In the meantime, please feel free to contact him should you have any specific questions that you would like him to address.

Sincerely yours,

Bill Hedeman

William N. Hedeman, Jr.
On Behalf Of:

(1) Black and Veatch, Bethesda, Maryland
(2) California Analytical Laboratories, Sacramento, California
(3) Camp, Dresser & McKee, Inc., Boston, Massachusetts
(4) CH_2M Hill, Denver, Colorado
(5) Compuchem Laboratories, Inc., Research Triangle Park, North Carolina
(6) EBASCO, Lyndhurst, New Jersey
(7) E.C. Jordan, Portland, Maine
(8) Ecology & Environment, Inc., Buffalo, New York
(9) ENSECO, Cedarhurst, New York
(10) ERCO, Cambridge, Massachusetts and Houston, Texas
(11) Enviresponse, Inc., Livingston, New Jersey
(12) GCA, Bedford, Massachusetts
(13) Gallob Analytical Service, Berkley Heights, New Jersey
(14) ICF, Incorporated, Washington, D.C.
(15) IT Corporation, Torrance, California
(16) Jacobs Engineering, Pasadena, California
(17) NUS Corporation, Pittsburgh, Pennsylvania
(18) OH Materials, Findlay, Ohio, and Environmental Testing Certification (ETC) Corporation, Edison, New Jersey
(19) PEI Associates, Inc., Cincinnati, Ohio
(20) PRC, McLean, Virginia
(21) Reidel Environmental Services, Portland, Oregon
(22) Rocky Mountain Analytical, Denver, Colorado
(23) Viar & Company, Alexandria, Virginia

ATTACHMENT

IMPACTS ON THE SUPERFUND PROGRAM IF FIVE-YEAR REAUTHORIZATION DOES NOT OCCUR

(1) **LOSS OF PROGRESS IN STUDY OR DESIGN WORK PLANNED FOR OR NOW UNDERWAY AT 440 NATIONAL PRIORITY LIST SITES:** EPA already has advised you that it is unable to initiate new remedial investigations and feasibility studies at 91 National Priority List (NPL) sites, and designs for remedies already selected at 74 NPL sites. In addition to this obvious impact, RI/FSs and designs that now are underway at 275 additional NPL sites face similar termination. This may impact a total of 440 sites, which is over 50% of all of the sites which have been proposed for inclusion or finalized on the NPL. Work performed for these ongoing studies and designs require current data (e.g., laboratory analysis, hydrogeological conditions; soil sampling), as these contaminants do not "freeze in time" once an RI/FS or design is initiated. If work must be terminated or even slowed down on these sites, many studies or designs will have to be repeated before an adequate remedy can be pursued.

(2) **LOSS OF A CRITICAL CONSTRUCTION SEASON:** EPA has advised you that 31 NPL sites now ready for construction work cannot proceed. Additionally, 15 more sites, already under construction, may be similarly affected. Most of these sites are located in areas of the country where construction cannot proceed rapidly, or at all, during winter months. We are now into the 1986 construction season. Unless this law is reauthorized quickly, our ability to work in this year's construction season will be severely limited, if not totally lost.

(3) **LOSS OF OUR KEY EMPLOYEES:** We face the prospect of shortly having to terminate at least 2500 of our key employees. They represent individuals with a variety of highly skilled qualifications, not easily found in the employment market. They are dedicated people who are willing to work long hours and spend weeks and even months away from their families in a constant "fishbowl" of public scrutiny. They are risk takers, willing to don cumbersome "moon suits" and confront dangerous hazardous spills and waste sites in weather ranging from sub-freezing to 100° and above temperatures. They are innovators, willing to correct a myriad of hazardous situations ranging from controlling a one-year fire of 7 million tires to the cleanup of dioxin contaminated soil in Missouri. They are laboratory technicians responsible for processing and analyzing thousands of soil, water and hazardous waste samples generated weekly at hundreds of sites across the nation, using highly complex procedures and sophisticated equipment to provide precise answers. They are engineers wrestling with a legacy of the past and charged to strain their ingenuity to forge remedial solutions that will protect our future.

The termination of these employees will ripple throughout our organization and clearly have a disrupted impact on all of our employees. The low morale experienced by those employees directly faced with this prospect actually overshadows all of our employees. The direct investment that we have made, which averages $25,000 or more to recruit and train each of these employees, will be lost. At least a year of renewed effort will be necessary to rebuild this workforce.

(4) **LOSS OF THE PROGRAM'S CREDIBILITY:** Closely associated with the loss of key employees will be a similar loss of the program's credibility. We invest an average of $15,000 per employee, once hired, for health and safety training, medical monitoring, and to familiarize them with the Superfund program requirements. Most of them, however, develop their real expertise working day to day in the field at hundreds of hazardous waste sites. EPA, the States, and the people living near these sites rely on their judgment and advice. The Justice Department relies on them as expert witnesses in enforcement and cost recovery cases. Should they leave this program, the public credibility established by their presence and experience will be lost, and it will take a considerable time, measured in terms of years, to regain this with new, "green" people who must be hired.

(5) **LOSS OF A NATIONAL RESPONSE MECHANISM FOR CATASTROPHIC SPILLS, AIR RELEASES, ETC.:** The skills developed by our employees go beyond hazardous waste sites found on the National Priority List. They are equally available to respond to the thousands of chemical spills from truck and rail, and the episodic air releases from various industries. To date, we have assisted EPA in directly responding to almost 700 such incidents by either stabilizing or actually cleaning up these problems. We have also directly assisted EPA and the States in oversighting and advising at thousands of similar incidents where States or industry have taken the lead in responding. These situations generally require instantaneous decisions, relying on the experiences of the past. Sophisticated equipment must be obtained, often within hours by rapid inter-state transport, and then deployed. Air and water contamination must be rapidly monitored and analyzed through

sophisticated mobile laboratory equipment. We must work in terms of hours and days, rather than months. A program "shutdown" would dismantle this critical response network.

(6) **LOSS OF THE SUPERFUND'S PROGRAM MOMENTUM:** We cannot be viewed as an electrical appliance, capable of being turned on and off at will. If employees are terminated, recruitment of new employees must begin again. This usually takes six to nine months, but may take as long as a year for employees requiring special skills. Normally, we must spend $10-20,000 to recruit employees requiring these specialized skills. If contracts are terminated, recompetition, particularly of the larger contracts, may take as long as a year based on previous experience. Costs associated with this recompetition will be considerable.

(7) **ELIMINATION OF MANY SMALL AND SMALL AND DISADVANTAGED BUSINESSES CURRENTLY PARTICIPATING IN THE SUPERFUND PROGRAM:** Many of our companies have diligently pursued EPA's goal of awarding a significant percentage of subcontractor work to small businesses and small and disadvantaged business. These include contracts for equipment purchases, well drilling, and laboratory analyses. Some of these companies rely exclusively on this work to stay in business. During the last two and a half years, these contractors have awarded business to these firms in the amount of $65.2 million, which is 72 percent of all subcontract awards made during this period. These firms have become a valuable resource to the Superfund program; the adverse impact on them if the Superfund program were to "shut down" would be devastating, both to them and the program.

(8) **SLOWDOWN OF PLANNED CLEANUPS BY OTHER FEDERAL AGENCIES AND THE PRIVATE SECTOR:** Many of us also are involved in related work at hazardous waste sites that are being addressed by the private sector and other federal agencies. We have observed that the momentum achieved by the Superfund program has formed a catalyst for similar efforts being pursued by the private sector and other federal agencies. We are concerned that if the momentum in the Superfund program subsides, a corresponding impact will be observed in the cleanup efforts of the private sector and other federal agencies.

(9) **LOSS OF PAST INVESTMENTS TO ACHIEVE A NATIONAL CLEANUP MACHINERY AND INCURRENCE OF UNNECESSARY "NON-CLEANUP" COSTS ASSOCIATED WITH CONTRACTOR TERMINATION, DEMOBILIZATION, AND SUBSEQUENT REMOBILIZATION:** Contracts cannot be terminated without cost. Expenses to demobilize equipment, office space, and other working conditions are considerable. Severance costs for employees also are required. Our experience in past situations involving termination of government contracts for convenience has resulted in costs ranging from 12-20 percent of the original contract amount.

We assume that if termination were to occur, Superfund ultimately would be reauthorized. New contracts would have to be procured, triggering additional costs associated with the procurement process. All of this money would be better dedicated to cleaning up the nation's hazardous waste problems.

CONSTRUCTION GRANTS FUNDING

Senator LAUTENBERG. The Congress has given EPA $600 million in fiscal year 1986 to use for the Construction Grants Program pending its reauthorization. That funding level is relatively small compared to the task ahead.

Has that affected the pace of the construction program at all at this point?

Mr. THOMAS. Senator, as Mr. Jensen pointed out, we are rapidly running out of grant money. A number of States, 13, by the end of next month, we anticipate will be essentially through their grant money. We have got an impact. We need the rest of the money for 1986.

Senator LAUTENBERG. OK. Your fiscal 1987 proposal would prohibit Federal funding for new construction grants and would phase out funding for ongoing projects. Yet, according to a survey by the Association of State and Interstate Water Pollution Control Administrators, there are at least 3,000 projects out there costing $20 billion, which are necessary to meet the July 1, 1988, municipal enforcement deadline. My State has over $3 billion in unfunded projects.

How do we deal with that? Your proposal certainly doesn't address it.

Mr. THOMAS. Senator, neither Congress nor the administration for the last number of years has ever supposed that the Federal money was going to be sufficient to meet the needs of all the municipalities when we look at, for instance, the July 1988 date that you suggest. There is absolutely no way that is going to be met, and if you look at construction across the country, you find a significant number of municipalities all over this country building facilities with their own money, without Federal money. That is why Congress didn't tie Federal money and the compliance date together. They are separate issues.

Senator LAUTENBERG. Is it fair to say, however, that the reverse is also true; that there are a number of States, a number of communities that are not moving ahead with essential water treatment projects because they don't have the funds available to do it and haven't adopted some of the innovative financing techniques that we have seen brought to the EPW Committee and EPA.

Mr. THOMAS. That is why our enforcement program is as big as it is in municipal compliance, because we are taking those municipalities to court.

NORTH RIVER AND RED HOOK

Senator LAUTENBERG. The blood out of a stone kind of theory still holds there. You may get a court victory, but by the time these things are disputed and debated, it will be a long time before we see improvements in water quality.

Is anybody on your staff up to date with the sewage treatment plant on the North River; when it will start operating?

Mr. THOMAS. North River and Red Hook plants are ahead of schedule, Senator.

Senator LEAHY. Was that in New Jersey? Is this Red Hook in New Jersey? Is this a parochial question? [Laughter.]

Senator LAUTENBERG. The North River is, not Red Hook.

Senator LEAHY. Let's make sure if we get parochial questions. [Laughter.]

Senator LAUTENBERG. No, this is a very serious problem. We have a couple of hundred million gallons a day of raw sewage from New York City washing by New Jersey's shore. We were talking about this problem before. Someone said 4 million gallons a day. Is that what comes from that Tijuana problem?

Mr. THOMAS. Thirteen.

Senator LAUTENBERG. Thirteen. We are talking about 230 million gallons a day of raw sewage flowing from New York City. You say the plants are on schedule?

Mr. THOMAS. It is ahead of schedule. The consent decree that established the schedule, it is ahead of that consent degree schedule, both those plants.

Senator LAUTENBERG. Does anybody want to venture a date? I think I have it firmly in my mind. I think it is May.

Mr. THOMAS. I am sorry, Senator, I don't have the date in front of me.

Senator LAUTENBERG. That is when we are supposed to start doing primary treatment.

Mr. THOMAS. I don't have a date in front of me, but I do have the answer that it is ahead of the schedule, whatever that date is. [Laughter.]

Senator LAUTENBERG. That may be comforting to you, but I invite you to take a swim with me in the Hudson River.

Mr. THOMAS. After that date, sir. [Laughter.]

[The information follows:]

NORTH RIVER AND RED HOOK SEWAGE TREATMENT PLANTS

The North River and Red Hook sewage treatment plants are expected to meet the court-imposed deadlines for construction and operation of primary and secondary treatment facilities.

North River is scheduled to be substantially complete and to start up its primary tank operation by May 1986; and to have its primary tank fully operational by August 1, 1986. North River appears to be ahead of schedule.

Red Hook is scheduled to be substantially complete and to start up its primary tank operation by May 1, 1987. Red Hook appears to be on schedule.

North River is scheduled to be substantially complete and to start up its secondary treatment system by May 1, 1991; and to have its secondary treatment system fully operational by August 1, 1991.

Red Hook is scheduled to be substantially complete and to start up its second treatment system by May 1, 1989; and to have its secondary treatment system fully operational by August 1, 1989.

CONSTRUCTION GRANT MANAGEMENT

Senator LAUTENBERG. Under the Clean Water Act, States are authorized to use construction grant funds for water planning and managing the Federal Grant Program. The reduced 1987 funding level means that States have roughly 30 percent, I think that is the right figure, less Federal grant assistance for water quality programs. I am concerned about the impact of the reduced funding that the States are going to have to deal with and whether they will be able to appropriately manage their water problems.

Mr. THOMAS. I think the States will appropriately manage their water problems. They are facing, and are going to face, a financial problem because of this Federal lag in the appropriation. There is no question about that. A number of States will compensate for that, I am sure, with State funds, but as we look at this year, as you pointed out, by only getting the $600 million appropriation as opposed to the $2.4 billion, that not only presents a grant problem that the States are beginning to look at.

It means what are the management funds necessary in order to get a staff, so that is the problem. The one point I would make is that there are other funds, as you know, that we allocate to the States and award to the States for our water management problems, and for 1986 those other funds are available to them. So there is a substantial amount of money that goes to the States for planning, management, and administrative expenses.

Senator LAUTENBERG. Sufficient to do the job with?

Mr. THOMAS. For 1986, I feel it is sufficient to do the job, if we get the appropriation soon for the Construction Grants Program. Even that, on the management and administration side for 1986, I don't think is as critical because of the funds in the other program areas.

Senator LAUTENBERG. Right, but there is a degree of urgency, though, to getting those funds appropriated?

Mr. THOMAS. That is no question. On the construction grant money, there is a degree of urgency in that the States are running out of their allocation, and we are talking about 13 States next month that essentially won't have any funds available to fund projects.

Senator LAUTENBERG. That is pretty serious.

Mr. THOMAS. It is.

RADON GAS

Senator LAUTENBERG. I want to take up one other matter, which you and I discuss frequently—radon gas. If I am not mistaken, there was an article in the New York Times recently which reported on a health review by some experts of the relationship between radon gas and lung cancer. A prominent researcher mentioned in the article suggested that long-time exposure to radon could increase the chances of lung cancer out of 1,000 people exposed to radon gas to a number as large as 500, that 500 out of 1,000 might actually contract lung cancer as a result of that radon gas exposure.

Are you familiar with that? It was in yesterday's New York Times. It was very interesting. Certainly, I commend it to your review.

Mr. THOMAS. I will see it. Obviously, the levels that they were talking about must have been very high.

Senator LAUTENBERG. They were talking about a fairly high level. But, even the low level, a standard 0.02 working level; the 0.02 working level is one that certainly is not a high comfort level either. We have talked about this a lot, and I am out of time. But, Lee, I would just like to wrap up and say the fiscal years 1986 and 1987 appropriations for radon research are an improvement.

The chairman just waved the magic wand. I have more time for your review here.

Thank you, Mr. Chairman.

EPA is undertaking several studies regarding radon mitigation programs. But, the Mitigation Demonstration Program is, in large part, the backbone of Federal involvement at EPA. Is that not the case? That principally, you are doing a national assessment? That is underway, is it not? And then there is a demonstration in mitigation.

Mr. THOMAS. I am going to ask Jim Barnes if he would comment on it. As I look at our radon strategy—as you know, because you and I discussed it a little bit—it really involves coordination with several agencies at the Federal level working with the States. We have had a lot of coordination among States, the Center for Disease Control, the Department of Energy, and others, but a lot of interaction with States in what they are doing, health authorities, and others at a State level.

Our work has largely been providing coordination and a focal point at the Federal level in developing action levels which are looking at the health risk, defining the kind of action that may be necessary based on the health risk at different levels and ensuring that we have got a good, technical guidance and technical protocol program for the instruments that are used in measuring radon in homes. Finally, we are providing a substantial amount of information that would be available for homeowners; in what kind of action could be taken by a homeowner to mitigate the problem in their home, as you said. Our research effort has looked at a number of homes in Pennsylvania, and we are getting ready to look at a number of additional homes this year and next year.

Senator LAUTENBERG. In New Jersey?

Mr. THOMAS. We are working on developing mitigation techniques, and we are going out shortly with a manual for homeowners to show what could be done to mitigate radon gas problems within their homes. That is a general kind of overview of what we are doing. There is a lot more than that, but that is generally the thrust of it.

Senator LAUTENBERG. Right, but even though the tone of your response implies that others are doing a lot of work, you do, Lee, ultimately wind up being the focal point for all of this. EPA's radon program needs resources; it needs staff. What is the budget request for fiscal year 1987?

Mr. THOMAS. A little over $3 million, and I think 21 or 22 staff.

Senator LAUTENBERG. Fiscal year 1987, $3 million for radon? I think it was $1.5 million last year; was it not?

Mr. THOMAS. It is $3.1 million for 1987.

Senator LAUTENBERG. $3.1 million. As we see the magnitude of the problem, it becomes more and more obvious, that we are going to have to spend, I think, a lot more money than anybody anticipated to address this radon gas problem. The research and coordinating job you have is an enormous one. I didn't realize that you were going to be producing material directly for the homeowner as opposed to disseminating information to State agencies to let them, in turn, make it available to the public.

Mr. THOMAS. We are working with the State agencies for distribution. The guides we are producing, for instance, one we are working on is called "A Citizens Guide for Action." It really relates to the action levels from measurements, what risk each action level presents. We are working with the State health authorities. Most of them, I think, will use that information and use their logo and name and actually use it within their State along with us.

Senator LAUTENBERG. I thought you were issuing the reports.

Mr. THOMAS. We are doing the same thing with the home mitigation guide, "The Homeowners Guide for Mitigation," working with State agencies, again.

Senator LAUTENBERG. In New Jersey, as you know, there is increasing evidence that radon contamination exists outside the Reading Prong area, although it was originally thought to be present only in the Prong. As many as a million or more homes in New Jersey could be exposed to radon gas. It is an enormous problem; it may be half of our land area.

So we are going to need all the help we can as the program gets established and you look at the 6 million people potentially exposed in all of the States.

So I would urge you, Lee, to continue to lend it whatever force you have got. I think that we are going to be needing additional funding as time goes by, and I look forward to your continued cooperation. I appreciate the opportunity to see you and all of your staff here today.

Thanks, Mr. Chairman.

Senator GARN. Senator Proxmire?

INDOOR AIR

Senator PROXMIRE. Thank you, Mr. Chairman.

I would like to follow up on Senator Lautenberg's questions with respect to radon. Recently, the New York Times carried stories on radon contamination on indoor air. At the same time, over 35 Wisconsin communities have been found to have radioactive contamination in their drinking water wells.

Have you done any mass testing of areas for radon air contamination? Will you be concentrating attention on areas where naturally occurring radioactivity is known?

Mr. THOMAS. Senator, we have done national testing in States, in areas that have a radon problem to look at the national issue of radon gas. We are in the process now of developing a national survey. We are working closely with State radiation health officials, as well as other Federal agencies, but our intent is to actually move forward with a national survey associated with radon gas this year and next.

Senator PROXMIRE. Will that national survey include my State, Wisconsin?

Mr. THOMAS. Let me ask Craig Potter, who is the Assistant Administrator for Air and Radiation Programs.

Mr. POTTER. Yes, Senator, we are going to be looking at all the States when we get into the National Assessment Program. It has outyear implications beyond just the next 2 years. It is going to go on, if necessary, projected, for the next 5 years.

Senator PROXMIRE. It will cover Wisconsin?

Mr. POTTER. Yes, sir.

FIFRA REAUTHORIZATION—COST ESTIMATE

Senator PROXMIRE. This week, Senator Lugar is introducing a new pesticide bill. The same bill has been introduced in the House. The EPA provided me with figures estimating the cost of the program under this bill. Can you tell me how these figures were arrived at? I am especially concerned about the high figures for the next 2 years.

Mr. THOMAS. Let me ask John Moore, our Assistant Administrator for Pesticides and Toxic Substances, to respond.

Mr. MOORE. Senator, those figures are very preliminary.

Senator PROXMIRE. Those figures are very preliminary?

Mr. MOORE. Yes, sir. We have yet to see the bill that was introduced. We assumed the bill that was introduced was similar to drafts that we had seen.

There is a big cost impact in the first couple of years that deals with identifying the data that is needed to review the pesticides. Then there is a dropoff for a couple of years, and then there is another hump on the fourth to the seventh year where you have to get into a labor-intensive effort to review such data. Our estimates, as I recall, for the first couple of years use, $69 million as a current base for the operation of the total pesticides program including research and development, and in order to comply with the requirements of that bill, we probably would be up around $110 to $120 million annually for the first couple of years, and then it would drop down and then go up again.

Senator PROXMIRE. How did you arrive at the figures?

Mr. MOORE. We assumed the work associated with the new bill would be heavily EPA labor-intensive, as opposed to work done under contract. So we came up with an estimate of the work-years it takes to identify the data that is required and then to review the data after it has been developed.

Senator PROXMIRE. What proportion of the costs were labor?

Mr. MOORE. I don't have the exact figure, but I would assume that the proportion of the costs of the reregistration program that would be direct EPA labor is going to be up somewhere around two-thirds of the total labor costs in Senator Lugar's pesticides bill. It can be way up there.

[The information follows:]

LABOR COST IN SENATOR LUGAR'S PESTICIDES BILL

Under Senator Lugar's bill, the total cost of the reregistration program over all years, would be from $250 million to $300 million. Of this total, direct EPA labor costs would comprise from $160 million to $190 million.

WAUSAU, WI, SUPERFUND SITE

Senator PROXMIRE. The city of Wausau, is, as you know, in north-central Wisconsin and several Wisconsin companies have been included as potentially responsible parties for a Superfund cleanup site. The city is concerned because considerable efforts were expended before the site was put on the Federal list and because of the great cost involved.

They wanted to avoid unnecessary duplication. Originally, Wausau, thought region 5, would recommend using the existing studies. Later, region 5 said they didn't have the authority to allow this use. Wouldn't it be better to have the city and other PRP's use their limited funds for cleanup instead of redoing existing studies about reputable engineering firms?

Mr. THOMAS. Win, I don't know; do you have a feeling for that?

Mr. PORTER. Senator, I don't have the specifics on that case, but I will certainly look into it. We are running into quite a few cases around the country, I might say, where people are worried about duplicating effort. The problem is it is not always apparent when you get into a real case. We have got to be sure that we move out smartly as far as getting done what has to be done, but I will certainly look into that case.

[The information follows:]

WAUSAU GROUND WATER CONTAMINATION

Existing studies do not duplicate a detailed remedial investigation and feasibility study of the site as defined in the NCP. In particular, existing studies do not define the area/extent of ground water contamination; do not locate all of the sources of contamination; and do not assess the endangerment posed by contaminants in the aquifer.

Further information must be collected and evaluated in order to plan an effective ground water cleanup.

GROSSE ILE LAB

Senator PROXMIRE. Mr. Thomas, your request cuts the funds to the Grosse Ile lab by two-thirds. The request leaves about $500,000, a third, when salaries and funds are deducted, $0.5 million, for the only lab facility we have dedicated to the United States-Canada Great Lakes Water Quality Agreement.

That $0.5 million for a body of water that covers eight States and two countries and representing 20 percent of the world's supply of surface fresh water.

As you are aware, the Great Lakes Water Quality Agreement is subject to renegotiation this year? Does it make sense to reduce funding for the Grosse Ile lab by two-thirds prior to reconsideration of the agreement.

Mr. THOMAS. Senator, I will ask Don Ehreth, but overall, we requested a Great Lakes program that includes the research program you talked about which also includes the national program office for the

Great Lakes that continues a strong program office with maintenance of staff there. So as we look at the Great Lakes program, we look at the research as well as the overall program work that is being done there at the Great Lakes office in Chicago. Specifically, the work at Grosse Ile lab, let me ask Don to respond.

Mr. EHRETH. Senator, the total actually is about $1 million, and that supports our in-house capability. That is the salaries and expenses for FTE's which are dedicated research. This is the same level that we had requested for our own 1986 budget which was further added to by congressional appropriation action with $1.5 million additional money.

When you take a look at the Great Lakes program in terms of whether or not that is enough money to spend or not, we have developed a Great Lakes program plan to address specific issues, specific issues with regard to those lakes, sedimentation, resuspension of pollutants within the sediment, toxic pollutants, fate and transport, related effects and things of that nature.

Consequently, we have been able to focus direct resources on actually achieving specific objectives such as the Fox River toxins and ecological impact assessments, documentation of validation of many of the models we developed in the Great Lakes, both eutrification as well as toxic effects. Many States associate this work with studies on toxins in aquatics related to dioxides and furons. Specifically, we spent a great deal of time there. Of course, one of the more important things we have developed as a result of this program over the years is a field assessment process, and we have documented that in the form of a manual that will be available this year, such that the States in that local area will be able to address specific problems associated with the Washington manual.

Senator PROXMIRE. Nevertheless, there is a drop here of two-thirds in the actual research money and it is being done precisely on the eve of the talks between the United States and Canada on water quality. It seems to me that the timing of that reduction is not very logical.

Mr. EHRETH. I can't address that specific issue. But in terms of what we have left in that plan to address, the resources will be dedicated toward completing those studies or furthering those studies on fate and effects. I think you have to take into consideration, sir, that the Duluth laboratory, which is really the parent laboratory to the Grosse Ile laboratory, does a tremendous amount of research in aquatic effects and aquatic toxicology.

The Athens Laboratory further does work in the area of transport-related effects. Those two laboratories together have a combined budget of several times the Great Lakes allocation alone, whose products can be and will be used to study specific issues in those Great Lakes areas.

Mr. THOMAS. However, Senator, I think you have a very good point, and I want to review the issue internally at the agency.

Senator PROXMIRE. I appreciate that very, very much. Let me make one more point in connection with that. Given that we are not likely to see an acid rain bill emerge from the administration, we ought to at least monitor our obligation to the Canadians with respect to water quality. I am happy you have made that commitment.

Did your office consult with our Canadian counterparts before recommending the budget cut?

Mr. THOMAS. Which one, now, Senator?

Senator PROXMIRE. The cut of two-thirds.

Mr. THOMAS. Relating to the Grosse Ile project. I don't believe that was done.

Mr. EHRETH. No; it was in the budgetary process.

GREAT LAKES PROGRAM

Senator PROXMIRE. Mr. Chairman, I don't want to take too much time here, let me ask one or two quick questions quickly. Your request for the Great Lakes National Program Office mentions monitoring in near-shore areas. It does not mention the establishment of a Great Lakes-wide monitoring network. The latter is required by the water quality agreement and would require open-lakes monitoring in lakes like Lake Superior so that we may better understand the role of air transport in bringing toxins to the lakes. Does your request include funding to establish a monitoring network or provide for open-lakes monitoring?

Mr. THOMAS. We will provide that for the record, if you would like.

[The information follows:]

GREAT LAKES NEAR SHORE MONITORING

The Great Lakes National Program Office has been systematically monitoring Great Lakes water quality, atmospheric deposition, fish, and sediment for a number of years in response to U.S. commitments under the Great Lakes Water Quality Agreement with Canada. Initially, the focus of the monitoring program for water and air was on nutrients. Now the focus is being shifted to toxics. For example, the redesign of the Great Lakes atmospheric deposition [GLAD] network being funded in 1986, and to be implemented in 1987, is to provide for improved toxics identification and quantification. Water quality monitoring for toxics continues to concentrate on near-shore areas and through bioaccumulation in fish because toxics in open lake areas are at extremely low levels, which are difficult and expensive to identify.

It should be noted that our Central Regional Laboratory in Chicago has been operating two shifts to accommodate the heavy demand for lab analysis generated by the Great Lakes sampling programs.

Senator PROXMIRE. Fine. One other question.

The National Academy of Sciences in a report released last year in connection with the Royal Society of Canada made extensive recommendations with respect to the U.S. role in fulfilling the water quality agreement. One of those recommendations involved establishing a toxics monitoring network. Did your office review those recommendations in preparing its fiscal 1987 budget recommendation to the Great Lakes National Program Office?

Mr. THOMAS. I will have to review that, Senator, and let you know specifically.

[The information follows:]

TOXICS MONITORING NETWORK

The National Academy of Sciences and the Royal Academy of Sciences Report was published too late for our fiscal year 1987 budget planning cycle. Nevertheless, the agency will be addressing several of the concerns raised in the report in its research program and the National Great Lakes Program in fiscal year 1987.

Research on the transport, fate, and effects of toxic substances will continue. Emphasis will be given to the study of the effects of contaminated sediments in the Great Lakes connecting channels. The Great Lakes National Program has resources dedicated to in-lake monitoring, the collection of precipitation samples of metals and nutrients from the Great Lakes air deposition network, and completing the revision of the network to determine wet and dry loading of metals and nutrients.

The agency is currently reviewing the National Academy of Sciences and the Royal Academy of Sciences Report. Should additional resources be needed beyond those we have already earmarked for this program, we will consider supplementing them with resources in our transport and fate program and/or our Aquatic Toxicology Program.

SUBMITTED QUESTIONS

Senator PROXMIRE. I have a couple of questions for the record.

Senator GARN. Mr. Thomas, we appreciate your direct and candid answers to our questions today. I have no more for you orally, but I do have a number of pages of questions that I would like you to respond to the subcommittee in writing, in addition to questions submitted by other Senators.

Mr. THOMAS. I would be pleased to do that, Senator.

Senator GARN. Thank you very much.

[The following questions were not asked at the hearing but were submitted for response for the record:]

QUESTIONS SUBMITTED BY SENATOR GARN

EPA OPERATING PLAN

Question: Unlike many Agencies, EPA is in the enviable position of having an increasing budget in FY 1986 from which to absorb the sequestration reduction. Generally what impact has this reduction had on the Agency this year?

Answer: Like other domestic agencies that are not exempt from the provisions of the Gramm-Rudman legislation, all of our FY 1986 appropriations have been reduced by 4.3 percent.

While it is human nature not to welcome any reductions in what we believe are programs of high priority to the American people, we certainly can live within the bounds of the remaining 95.7 percent. We will be able to "tighten the belt" and continue to operate quality environmental programs within the FY 1986 constraints of the Gramm-Rudman legislation.

Question: What impact would you anticipate to flow from a 10% further reduction from this base -- should a second round of Gramm-Rudman reductions be ordered in October?

Answer: For FY 1987, the Agency has not developed specific plans which anticipate reductions of 10% or more to the President's requested levels. Our initial analyses indicate that a reduction of that magnitude could impact our ability to avoid major disruptions to our workforce and our ability to maintain all our high priority programs.

There are many options the Agency could explore if faced with mandated budget reductions before it would be necessary to resort to unwanted personnel actions. For instance, we could institute an Agencywide hiring freeze, delay necessary support services and contract studies or seek flexibility between appropriation accounts.

Because of the multitude of potential options, it is difficult to speculate as to the precise level of reduction to our FY 1987 request which would necessitate such drastic action as furloughing or RIFS of the Agency's current workforce.

HAZARDOUS WASTE

Question: Why does your FY 87 request for the hazardous waste program only provide 20 additional workyears above the 1986 level when the RCRA program faces numerous statutory deadlines and new responsibilities under the 1984 Amendments?

Answer: The 1987 President's Budget includes nearly 1,500 workyears and over $250 million for the hazardous waste program. These resources will enable us to implement a strong, effective and comprehensive hazardous waste management program.

The 20 workyears and $18 million increases in 1987 above current 1986 levels are actually very significant amounts and are in addition to very large increases for the hazardous waste program over the past several years. Compared to the 1985 President's Budget, the 1987 levels reflect a 372 workyear and $113 million expansion of the program.

Question: The funds for the Agency's hazardous waste enforcement effort were increased to $26 million. What enforcement measures will be added to ensure improvement in the rate of compliance with the RCRA program?

Answer: Achieving the goal of a high compliance rate with RCRA regulations will require strong efforts by EPA and the States over a period of several years. Enforcement actions by themselves cannot ensure compliance with RCRA regulations. The approach being taken by EPA and the States for improving RCRA compliance includes taking timely and appropriate enforcement action when violations are identified.

Additional EPA enforcement efforts are being directed at implementing the National Enforcement Response Policy for addressing significant violations of the RCRA program. Additional attention to the Civil Penalty Policy to ensure appropriate fines are levied against violators will be made. EPA oversight of State enforcement actions will continue to be exercised to ensure nationally consistent performance. Appropriate guidance (such as the RCRA Ground Water Monitoring Compliance Order Guidance) will be widely distributed to assist EPA and States in taking adequate actions against violations.

Our 1987 request provides resources to address compliance violations through timely enforcement action. The 1987 request supports enforcement for ground water monitoring requirements; enforcement of loss of interim status provisions, specifically false certification and facilities continuing to operate in violation of the law; and enforcement of closures in accordance with the regulations. It also provides resources for appropriate corrective action at facilities where a release has occurred.

TOXIC SUBSTANCES

Question: I see that once again the President's budget makes no request for funds under the Asbestos School Hazard Abatement Act. Does this reflect EPA's initial request to OMB?

Answer: Funds for loans and grants under the Asbestos School Hazard Abatement Act were not included in EPA's initial request to OMB. However, funds were included to perform technical assistance activities and to support abatement activities, state contractor certification grants and information and training centers. A total of $3.5 million to support these activities appears in the President's Budget.

ENFORCEMENT

Question: There have been allegations that your enforcement effort suffers due to insufficient attorneys in Regional Offices. Does this budget request address that problem?

Answer: In fiscal year 1985 there was a problem regarding insufficient legal resources in Regional Offices. However, the Administrator in distributing the fiscal year 1986 Congressional add-on provided the Regions with dollars and workyears to hire additional attorneys. Thus, assuming workload from media offices remains consistent with the FY 1987 budget submission this significant problem will be resolved.

ACID RAIN PROGRAM

Question: What is the FY 87 budget for EPA's Acid Rain program as well as the total Federal effort?

Answer: In fiscal year 1987, EPA's Acid Rain budget request totals $55 million. The Federal budget for acid deposition research totals $85 million.

Question: What has been the growth in resources over the past several years?

Answer: Since 1980, the Federal-wide Acid Rain budget has increased from $11 million in 1980 to $85 million in 1987, a 676 percent increase. In total from 1980 through 1987, the Federal Government will have spent $336 million on acid rain research. The following table summarizes EPA's budget and the total Federal budget for Acid Rain research since 1980:

Fiscal Year	EPA Program ($ in Millions)	Total Federal Program ($ in Millions)
1980	$ 1.9	$ 11.0
1981	6.9	13.0
1982	9.2	18.2
1983	13.1	23.3
1984	22.8	35.0
1985	38.0	64.8
1986	48.7	85.0
1987	55.1	85.4
Total	$195.7	$335.7

INDOOR AIR RESEARCH

Question: Why is EPA now requesting resources for indoor air research, after stating for several years that the Agency lacked the regulatory authority to conduct this research?

Answer: The Agency has determined that while we do not have the specific regulatory authority to conduct research on indoor air quality, we do have authority under the Clean Air Act to measure and evaluate total human exposure to airborne pollutants. We think that indoor sources may contribute significantly to total exposure and that research is needed to assess the magnitude of exposure as well as the health effects of indoor pollutants and potential mitigation techniques.

EPA will continue to coordinate its indoor air research activities with other member Agencies of the Committee on Indoor Air Quality (CIAQ). These activities are vital to the completion of the mission of the CIAQ.

LIMESTONE INJECTION MULTI-STAGE BURNER (LIMB)

Question: How much has EPA spent on the Limestone Injection Multi-stage Burner (LIMB) to date?

Answer: Through FY 1986, EPA will have spent $47 million on the development and commercial demonstration of the LIMB technology. The following table illustrates LIMB funding since FY 1979:

Fiscal Year	EPA Program ($ in millions)
1979	$ 0.3
1980	0.1
1981	2.5
1982	4.1
1983	5.4
1984	10.4
1985	15.8
1986	8.7
Total	$ 47.3

Question: Why have you reduced the LIMB budget in FY 87?

Answer: The decrease in LIMB resources in FY 1987 reflects the completion of funding for the commercial demonstration of LIMB on a wall-fired utility boiler as well as the addition of $5 million by Congress in 1986 for the tangentially-fired demonstration. As a result, the LIMB program will continue to be phased down over the next few years, as market forces should enable industry to carry forward the refinement and application of this research.

KANAWHA VALLEY AIR TOXICS STUDY

Question: In the FY 86 Appropriations Act, Congress provided $250,000 for a comprehensive health effects study of the Kanawha Valley in West Virginia where there exists a high concentration of chemical production facilities. The EPA contribution was to be part of a coordinated effort including substantial non-Federal support. What is the current status of this effort?

Answer: Prior to the FY 1986 appropriation of $250,000, the EPA engaged the Harvard School of Public Health (HSPH) to conduct a feasibility study in the Kanawha Valley. This effort was intended to ascertain if enough scientific information is available in the Valley to conduct a larger-scale study examining an association between air pollution and health. The HSPH report was received on March 19, 1986, and is currently undergoing evaluation by the Agency. The report is expected to serve as a preliminary proposal for development of the Phase One Study. The Agency will continue to work with HSPH and the National Institute for Chemical Studies to develop a comprehensive proposal for the study, which is expected to be underway later this year.

Question: The $250,000 appropriation was for the first phase of this study. What plans do you have for this ongoing effort?

Answer: The Agency is currently conducting a monitoring effort to confirm the presence of targeted compounds in Kanawha Valley, and to provide ambient air supportive data for a cross-media screen of sources and effects in the region being conducted under the Agency's Integrated Environmental Management Program. Based on the results of these monitoring and screening studies later this year, the Agency will make a determination whether further studies in the Kanawha Valley are warranted.

SUPERFUND TRANSFERS TO HHS

Question: Questions have been raised with the respect to the appropriate level of transfers from the Superfund account to the Department of Health and Human Services for studies related to toxics. Of the $900 million earmarked in the FY 86 Appropriations Bill, $21 million was to be transferred to HHS. What is the status of this transfer?

Answer: Since the Superfund Program has not be reauthorized, the $900 million earmarked in the 1986 Appropriation Bill is not yet available to the Agency and none of the $21 million was transferred to HHS. However, the Superfund Program is currently operating under a contingency plan and is using prior year unobligated balances to maintain essential activities. HHS, as well as the other agencies, are part of the contingency plan and have been given funding to sustain them through the second quarter of this year. According to the contingency plan, HHS will receive $7.6 million for FY 1986. Through the second quarter, HHS has received $4.6 million.

Congress has recently approved a $150 million interim funding measure. This money however, is only available until May 31. We are currently discussing this funding with HHS to determine what their needs are in this time period.

Question: What specifically will these funds be utilized for?

Answer: Specifically the 1986 resources enable HHS to develop protocols for disease registries, conduct birth defect studies, carryout toxicological testing of hazardous substances, and provide health-related field guidance and laboratory support at emergency responses. Funding provided to HHS in the contingency plan maintains the Federal infrastructure and supports essential on-going projects.

Question: Should Congress enact continued authority for Superfund soon what is your detailed request for this purpose in FY 87?

Answer: The 1987 request was not developed in detail and will be revisited after reauthorization.

GIARDIA CYST CONTAMINATION

Question: What is the status of the Agency's research and enforcement efforts on Giardia cyst contamination of water supply sources?

Answer: EPA's research efforts are continuing to develop methods for measuring and identifying Giardia in water, developing techniques for determining cyst viability, identifying animal carriers of Giardia and attempting to improve and develop treatment technology for removing Giardia cysts from water. A new immunofluorescent technique for identifying Giardia cysts was published in December 1985. This method is useful for detecting Giardia because it is faster, less cumbersome and more accurate than previous methods. Research is continuing on this technique in order to improve the sensitivity and reduce the cross reactivity of the antibody-antigen system.

Another research activity underway is an attempt to determine cyst viability. Current methods enable us to detect Giardia cysts in water supplies; however, determining their viability involves either the use of animals or a test tube excystation technique. EPA is conducting research to develop a less complicated, microscopic dye exclusion technique to determine cyst viability.

Since it is important to determine the source of Giardia cysts contaminating water supplies, EPA has conducted surveys of small rodents and other mammals in the wild to determine if they are carriers of Giardia. The results have demonstrated that many wild animals (field mice, beavers, muskrats, deer, elk, and bear) which live in watershed areas are carriers of Giardia.

EPA has actively sought to use its capabilities to assist the States and water suppliers in determining the extent of possible Giardia contamination problems. EPA's Health Effects Research Laboratory (HERL) has provided technical assistance to analyze water samples for Giardia during outbreaks in Pennsylvania and Massachusetts. HERL has also participated in two training workshops, one in Pittsburgh, Pennsylvania and another in Massachusetts, to train individuals on how to use the identification techniques. HERL will continue to provide assistance and training to the States as needed.

EPA's Water Engineering Research Laboratory is conducting research to develop effective treatment techniques to control Giardia. Cyst suspensions were treated with chlorine or with an alternative disinfectant. Changes in excystation behavior after disinfection were attributed to effects of the disinfection process, i.e., Giardia that can not break out of the cyst form are presumed to have been killed. Because the Giardia species that causes disease in humans could not be cultured, scarcity of cysts hampered disinfection research. Through in-house research, a cyst model infective for mice was adopted and an excystation method for this species was developed. This has greatly facilitated development of additional disinfection data. Work is still underway on the effects of low disinfectant dose at long holding times, under conditions of very cold (1°C to 5°C) water. This is the circumstance under which killing Giardia cysts is most difficult. Research on water filtration has shown that slow sand filters, diatomaceous earth filters, and rapid rate, deep bed granular media filters are all capable of removing 99% or more of the Giardia cysts present in drinking water. The rapid rate filters are dependably effective only when the raw water has been properly coagulated before it is applied to the filter. This research program has shown that effective barriers are available to prevent the passage of viable Giardia cysts into the nation's drinking water. Refinement and extension of our knowledge in this area is continuing.

EPA's regulatory and enforcement activities are progressing on schedule. On November 13, 1985, EPA proposed a Recommended Maximum Contaminant Level (RMCL) of zero for Giardia. This expresses the goal that pathogenic microorganisms should not be present in drinking water. Because of the time and difficulty of using the measurement and monitoring techniques, Safe Drinking Water Act requirements would lead to publication of a treatment requirement for Giardia rather than a Maximum Contaminant Level for public water systems using surface water. A final RMCL and a proposed national standard for controlling Giardia are currently scheduled for publication in the Federal Register in early 1987. This is part of a group of proposals for revised regulations for 43 substances that was published on November 13, 1985. This schedule reflects the massive task of processing these and other drinking water regulations, including technical and economic analyses in compliance with legal and administrative requirements.

EPA has encouraged States and local authorities to institute programs for controlling waterborne giardiasis since they have full authority to take any necessary actions to protect the public health. EPA's research program and on-site technical assistance during outbreaks of waterborne giardiasis have generated a large body of information on how to control this organism, and the knowledge is passed on to the States and water supply facilities. We will continue to assist them in any way that we can, as well as work as quickly as possible to complete the Federal regulations.

LEADED GASOLINE REGULATIONS

Question: Both the House and Senate appropriations reports expressed concerns over proposed EPA regulations on the reduction and termination of the use of lead additives in gasoline as they may impact on farm machinery. What is the status of this cooperative effort with USDA?

Answer: The Administrator of EPA has committed the Agency to a farm machinery testing program that will be carried out in 1986. A final report is scheduled for January 1, 1987, the deadline in the 1985 Farm Bill. The testing program will determine the effects that low levels of lead and alternative additives in gasoline have on engines designed to use leaded fuel. EPA is now entering into an interagency agreement (IAG) with the Department of Energy. The IAG allows the use of a respected testing firm already under contract with DOE and is the only practical way for EPA to complete this study in the very short time frame set by the Farm Bill. The work plan and quality assurance plan for the study will be reviewed and approved by both EPA and the Department of Agriculture. In addition, a consultant acceptable to both EPA and the Department of Agriculture will be used for independent evaluation of the test program.

DES PLAINES WETLANDS PROJECT

Question: Last year, this Subcommittee was requested to fund a wetland "Restoration" project on the Des Plaines River in Illinois. This project has received funding from the Fish and Wildlife Service as well as substantial local support. What is the Agency's position with respect to this rather novel approach to assessing the pollution abatement benefits of wetlands?

Answer: We consider the Des Plaines River Wetlands Demonstration Project a very important project for assessing the feasibility of reconstructing riverine wetlands for the purpose of improving water quality, flood control, and habitat values of rivers degraded by earlier channelization projects. The Open Lands Project provides an excellent opportunity to assess various compensatory mitigation techniques used for enhancing, restoring or creating wetlands. Of particular note to us was the level of monitoring proposed for the project; the data that such monitoring provides will not only verify the project's outcomes but also provide a needed database in wetland value assessment techniques.

We have met with a number of people involved with the project, including the Director, Donald L. Hey, and are impressed with the substantial progress that has been made towards implementation. Our Region V office has supported the project from its inception and will continue to work closely with those involved as the project progresses. We believe this is an effort which should go forward and have offered our assistance and expertise.

AMERICAN INDIAN POLICY

Question This subcommittee has expressed its concern over the adequacy of budgetary and staff resources being devoted to the substantial environmental issues confronting the Indian tribes of the nation. The difficulties confronting tribal governments with respect to impacts of off-reservation pollution sources as well as limitations on tribal technical assistance resources have raised significant questions over the implementation of the model EPA Indian Policy. Please detail the level of resources your agency has allocated for this issue and your plans for FY 87 to effectuate your Indian Policy.

Answer: EPA's approach to working with American Indian tribal governments is to integrate the EPA Indian policy into our ongoing programs. Therefore, we do not budget for the entire Indian program in the Environmental Review and Coordination (ERC) program element within the Office of External Affairs (Office of Federal Activities). Federal Activities is responsible for overall coordination of the program; resources contained in the program element to support this coordination effort total $500,000 and 3.0 workyears. We have requested the same amount for FY 1987.

We are submitting to you two reports, "EPA Activities on Indian Reservations: FY 85" and our "Interim Strategy for Implementation of the EPA Indian Policy". The first document, "EPA Activities...", provides the kind of information you are seeking with regard to FY 1985, the first year of program implementation. While it does not relate to FY 1986 or 1987, we believe it does provide a useful overview of the types and magnitude of Indian Program expenditures across EPA's activities (approximately $5.7 million and 38 workyears in FY 85). In addition, the Administrator has directed that his Assistant Administrators report their planned current fiscal year activities with Indian tribes, a summary of which we will be pleased to submit to you upon completion. The Agency's plan continues to be a gradual and meaningful increase in our activities, recognizing that major increases in our budget are unlikely at this time.

The following grants have been made by the Office of Federal Activities (within our appropriated $500,000) so far this fiscal year in support of our coordination efforts; to increase outreach, training, technical assistance and improve the environmental management capability of Tribal governments. It should be noted, however, that this does not define the overall EPA program.

Amount	Tribal/Organization
$ 15,000	Council of Energy Resource Tribes
10,000	Confederated Salish & Kootenai Tribes
10,000	Crow
10,000	Fort Belknap Tribes
10,000	Fort Peck Assiniboine & Sioux
30,969	Inter-Tribal Council of Arizona
10,000	Navajo Nation
56,084	Three Affiliated Tribes/Fort Berthold
15,000	Ute Tribe
$167,053	

ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS - FY'85

Office of External Affairs
Office of Federal Activities
November 1985

GLOSSARY

CAA = Clean Air Act

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CERT = Council of Energy Resource Tribes

CWA = Clean Water Act

D/I = Direct Implementation

F/A = Financial Assistance

IAG = Interagency Agreement

IHS = Indian Health Service

N/A = Not Applicable

OAR = Office of Air and Radiation

OEA = Office of External Affairs

OFA = Office of Federal Activities

OPTS = Office of Pesticides and Toxic Substances

OSWER = Office of Solid Waste and Emergency Response

Outreach = Communication

OW = Office of Water

PTS = Pesticides and Toxic Substances

PWSS = Public Water Supply Systems

RCRA = Resource Conservation and Recovery Act

T/A = Technical Assistance

UIC = Underground Injection Control

ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS - FY'85

INTRODUCTION

During the past fifteen years, the Environmental Protection Agency (EPA) has developed generally standard operating relationships with states and municipalities across the country. Because of their unique status, American Indian tribal governments have not specifically been included in this process. In November 1984 EPA issued an Indian Policy and Implementing Guidance, in which it committed to developing working relationships with tribal governments.

This report presents an inventory of current EPA activities relating to tribal governments and reservation lands. Expenditures of both dollars and workyears are presented by media program and by region. This information can be used to determine what the agency is doing now, and will also provide a baseline against which future activities can be measured.

Since the information used to prepare this report was submitted by the regions in response to a new questionnaire, it should be noted that the manner of classifying program activities may be inconsistent. We believe, however, that the general presentation is accurate.

We would like to thank the regions for their cooperation in providing us with the necessary information to compile this report. We would also like to thank the various offices throughout the agency which were willing to spend their time briefing us about their involvement on Indian reservations.

CONCLUSIONS

This report, based on an initial survey, has enabled us to make some observations concerning the agency's current involvement on Indian reservations.

1. In FY 85 EPA has expended approximately $5.7 million and 38 workyears on activities that relate to environmental conditions on Indian reservations. The charts on the following pages indicate the distribution of the resources by media program, by region, and as a percentage of the whole. (The work years expended on legal issues by headquarters and regional offices have not been collected and are not included in this total.)

2. It must be noted that conclusions regarding program or regional interest in working with tribal govenments consistent with EPA's Indian Policy cannot strictly be drawn from the information presented in these charts. A region may seem to be especially active because of one program, or a program may seem to be especially active because of the size of a few grants. This information can only be used to describe the activities that have occurred, largely on an *ad hoc* basis, during FY 85.

3. Every region with federally recognized tribes on reservations not subject to state jurisdiction (Regions II, IV - X) has some level of activity although the level of effort and programs involved vary widely.

4. As might be expected, the level of effort is greatest in those regions with a large number of Indian reservations (Regions V, VI, VIII, IX and X). While relatively large funding levels are shown for Regions I and VII, these reflect construction grants for wastewater treatment plants under the Clean Water Act.

5. With regard to program funding levels, the Office of Drinking Water is notable for the application of its program to Indian reservations across the regions, and has made the largest investment by far of all the programs in terms of personnel. Of significance is the development of an interagency agreement between the Office of Drinking Water and the Indian Health Service.

6. Funding under the Clean Water Act, while relatively high, is directed (over 80%) to 25 wastewater treatment projects and 2 clean lakes projects. Because of the statutory definition of tribes as municipalities and the termination of the

section 208 water quality management planning program, the only funds currently being used for water quality management planning or regulatory program development have been made available on a pilot project basis.

7. The bulk (70%) of the air quality monitoring program is in Region 8, although three other regions have initiated some level of effort in this area.

8. The pesticides program has been directed primarily to the larger agricultural/ranching reservations of the Plains and Southwest.

9. The hazardous waste management programs are initiating their efforts on what might be considered to be a pilot basis. With regard to remedial actions, additional sites may be identified for clean-up based upon the results of a hazardous waste survey initiated on Indian reservations last year by the Office of Solid Waste and Emergency Response.

10. Technical assistance and training are the focus of most of the financial and personnel commitments that are not directed to the more expensive (and fewer) construction-type projects (wastewater treatment systems, clean lakes, hazardous waste remedial actions).

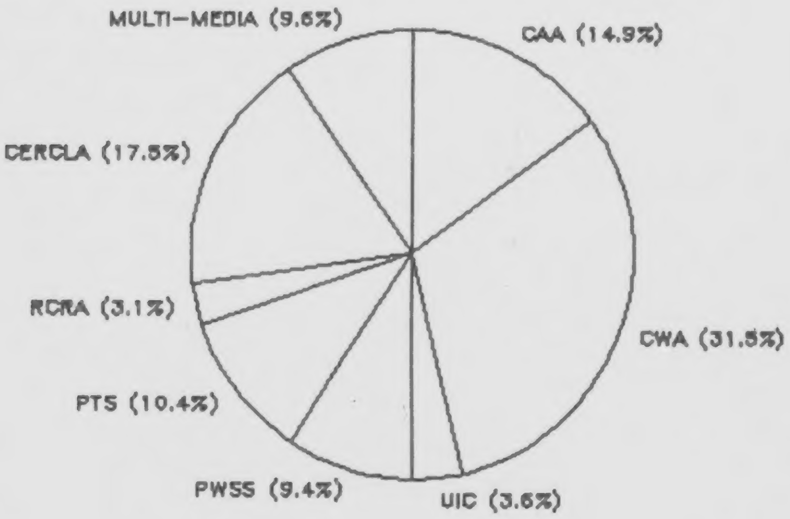
	OAR		OW						OPTS		OSWER				OEA/OFA			
	CAA		CWA		UIC		PWSS		PTS		RCRA		CERCLA		MULTI-MEDIA		TOTAL	
Reg.	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE	Funding Level	FTE
I			718.9														" 718.9	
II					.05	.2	7.6	.1						.02			" 7.65	.32
III																	"	
IV			1.2	.18			19.2	.3		.10							" 20.4	.58
V	72.0	.35	106.8	.22	5.0		78.7	1.27		.10	147.3	.52					" 409.8	2.46
VI			168.4		137.1	17.0	25.5	1.0		***							" 331.0	18.0
VII			476.3				4.5	.1									" 480.8	.1
VIII	592.12	2.23			61.3	.69	93.5	1.5	140.5	1.33	28.15	.52					" 915.57	6.27
IX	* 130.02	.03	.05	.66			146.0	4.5	201.0	.10			995.0	1.65			"1,472.07	6.94
X	50.0		320.0				16.8	.7	18.0								" 404.8	.7
HQ				.25			140.0	.2	234.0						** 546.0	2.0	" 920.0	2.45
TOTAL	844.14	2.61	1,791.65	1.31	203.45	17.89	531.8	9.67	593.5	1.63	175.45	1.04	995.0	1.67	546.0	2.0	5,680.99	37.82

($000)

* Includes 50.0 from OFA

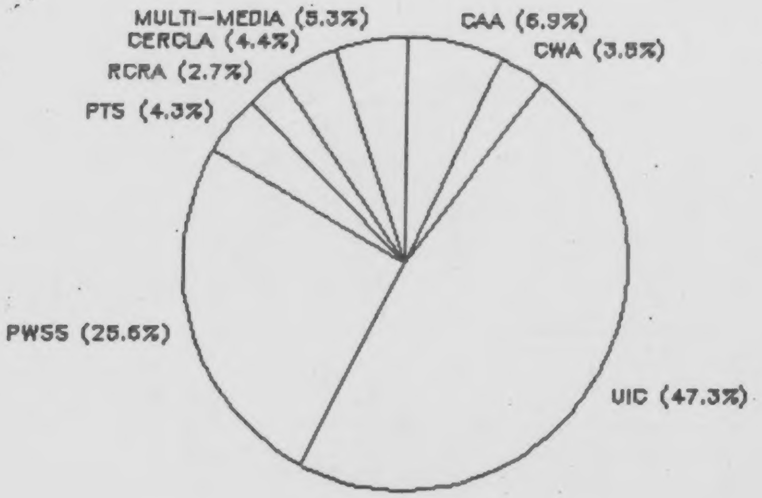
** Includes a multi-media program in Reg. VIII for which OFA provided 110.0 at the end of FY84.

*** Includes an estimated 85 person hours of technical assistance by the Region VI Radiation Specialist on Indian program questions on Region VIII and Region IX. (The Radiation Specialist is assigned to the Air, Pesticides, and Toxics Division).



EPA Programs on Indian Reservations

Funding Level by Media Program FY85

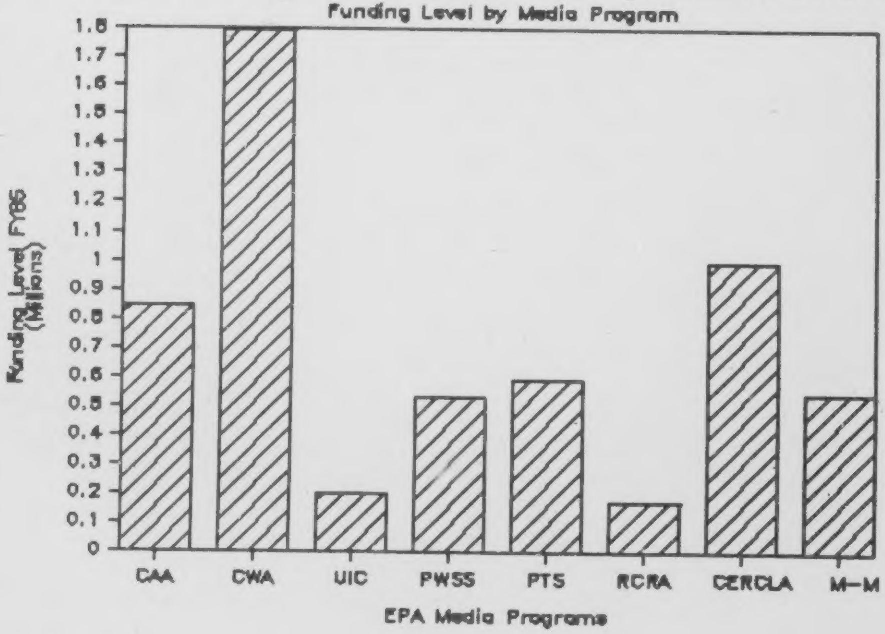


EPA Programs on Indian Reservations

Personnel Commitment by Media Prog FY85

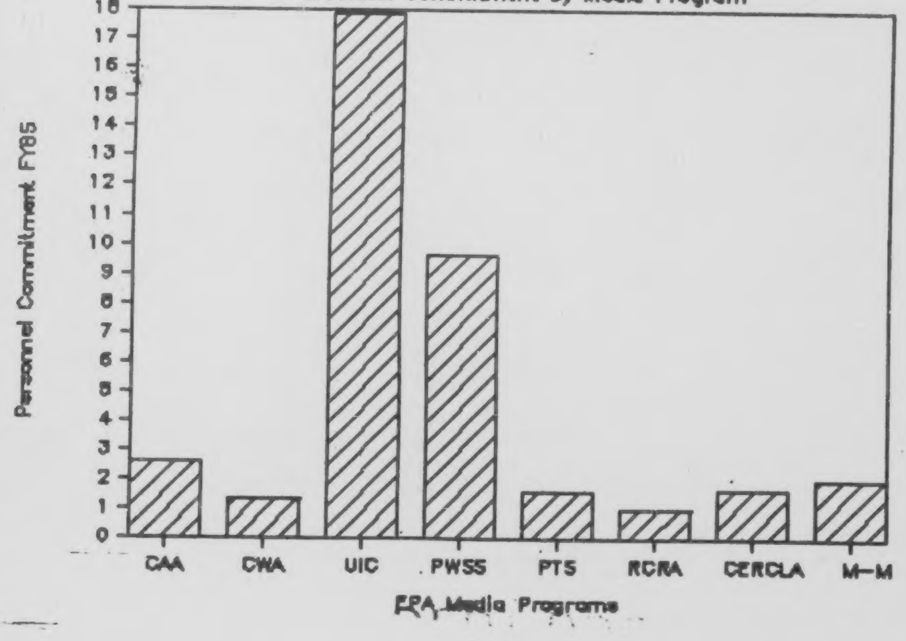
EPA Programs on Indian Reservations

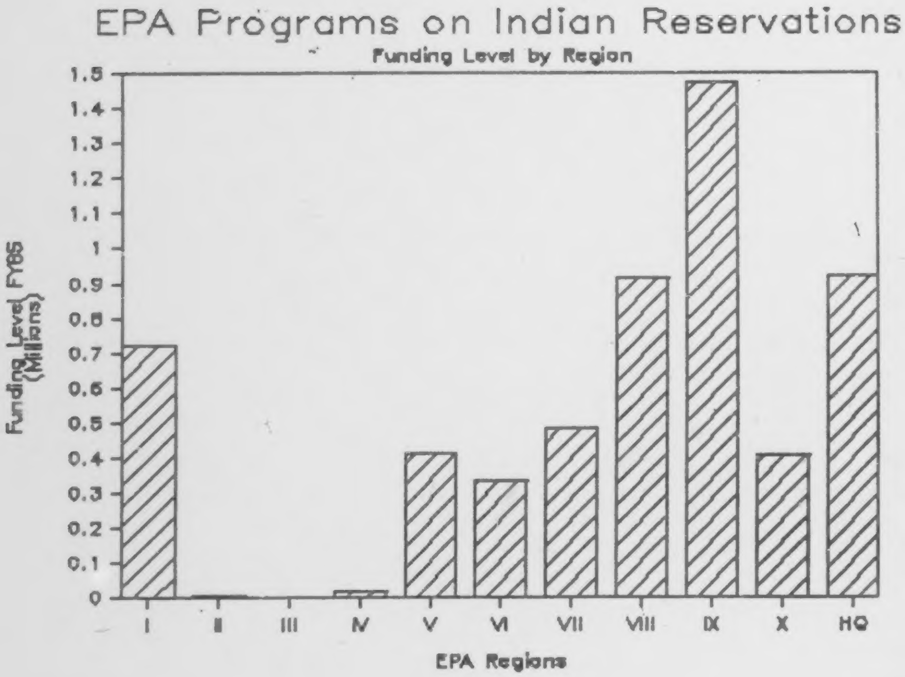
Funding Level by Media Program

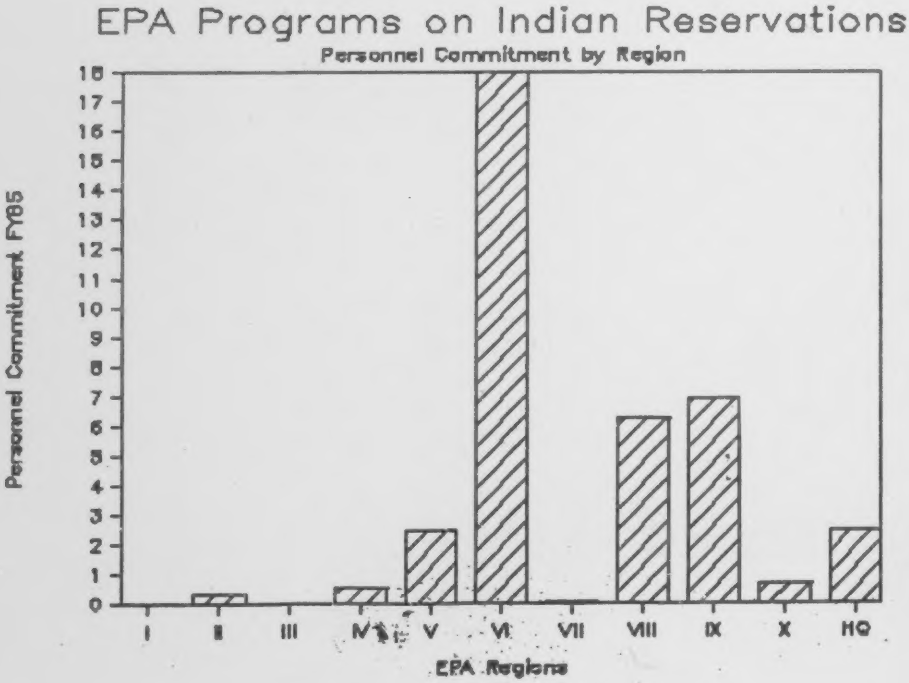


EPA Programs on Indian Reservations

Personnel Commitment by Media Program




EPA Programs on Indian Reservations
Funding Level by Region
Funding Level FY85 (Millions)
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
I
II
III
IV
V
VI
VII
VIII
IX
X
HQ
EPA Regions


EPA Programs on Indian Reservations
Personnel Commitment by Region
Personnel Commitment FY85
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
I
II
III
IV
V
VI
VII
VIII
IX
X
HQ
EPA Regions

THE OFFICE OF AIR AND RADIATION

The Clean Air Act authorizes nationwide program of planning, regulation, enforcement and research for control of air pollution. The EPA is responsible for setting national standards and emission limits, conducting research to strengthen the scientific basis for pollution control, and providing technical and financial support to State and local air pollution control agencies. These agencies have the primary responsibility for the control and prevention of air pollution.

The EPA strategy to meet the requirements of the Act in the 1980's focuses on six major program objectives. They are as follows:

- Achieve national ambient air quality standards (NAAQS's) to protect public health.
- Reduce the risk of exposure to hazardous air pollutants.
- Increase the capacity and improve the effectiveness of state and local air quality agencies.
- Ensure NAAQS's based on accurate, up-to-date information on public health and other effects.
- Review policy alternatives and strategy options available to address acid deposition.
- Develop and support programs to maintain environmental quality and address new air quality problems.

Each of these six program objectives correspond to one of two fundamental goals of EPA. The first two program objectives correspond to the EPA goal to "redress previously neglected problems and restore environmental quality to acceptable levels." The last three program objectives correspond to the EPA goal to "anticipate and prevent future environmental problems and maintain high levels of environmental quality." The third objective to strengthen State and local agencies addresses both goals.

The national mandate to protect public health and the environment from the adverse effects of radiation is also derived from the Clean Air Act, as well as from several other statutes. There are two major program objectives under the radiation program. They are as follows:

- Reduce risk of exposure to unhealthful levels of radiation.
- Maintain comprehensive surveillance and effective emergency response capabilities.

OFFICE OF AIR AND RADIATION

Descriptions of technical and financial assistance programs available from the Office of Air and Radiation as stated in the Office of Management and Budget's June 1984 Catalog of Federal Domestic Assistance are:

PROGRAM DESCRIPTION		FINANCIAL	NON-FINANCIAL
• 66.001	AIR POLLUTION CONTROL PROGRAM GRANTS.......	*	
• 66.003	AIR POLLUTION CONTROL MANPOWER TRAINING GRANTS............................	*	
• 66.006	AIR POLLUTION CONTROL-TECHNICAL TRAINING...		*
• 66.007	AIR POLLUTION CONTROL-NATIONAL AMBIENT AIR AND SOURCE EMISSION DATA...............................		*
** • 66.008	AIR POLLUTION CONTROL-TECHNICAL ASSISTANCE.		*
• 66.009	AIR POLLUTION CONTROL-TECHNICAL INFORMATION SERVICES......................		*

SUMMARY OF CURRENT EPA ASSISTED AIR PROGRAMS OCCURRING ON INDIAN RESERVATIONS

REGION	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	†			
II	N/A		N/A	No active Air Programs are occurring.
III	†			
IV	N/A		N/A	No active Air Programs are occurring.
V	$72.0		F/A	Air Pollution Control Cooperative Agreement.
		0.35	D/I	Agency resources utilized in assisting administering the Air Program co-operative agreement.
VI	N/A	***	TA	No active Air Programs are occurring***
VII	N/A			No active Air Programs are occurring
VIII	$540.0		F/A	There are nine monitoring grants being funded in region VIII.

†Indian tribes in Regions I and III are provided environmental services by or through state agencies.

**Deleted from 3/85 catalog.

***See footnote on page 5.

OFFICE OF AIR AND RADIATION

REGION	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VIII	$50.0	1.0	T/A	Air quality monitoring assistance by the State of Montana including equipment servicing and location selection. Coordination between reservations and state program activities. This assistance is available to all tribes receiving Air Quality Monitoring Grants.
	$2.12	0.2	T/A	A project officer provides training in handling and interpreting air quality data. Tribes are brought in for consultation.
		0.5	T/A	A Council of Energy Resource Tribes officer provides assistance in developing grant applications, data analyses, program design, and emission inventory.
		0.2	Outreach	Outreach activities include telephone contact, monitoring visits, and distribution of information. An attempt is made to maintain weekly contact.
		0.3	D/I	There is a personnel commitment to directly implement the development of the air program.
IX	$130.0		F/A	Air Pollution Control Grant Pilot Project
			T/A	The region plays an advisory role in the pilot project.
	$.02	0.03	T/A	The agency provides site inspection, report review, data interpretation, and equipment on loan to measure radiation at abandoned uranium mill sites.
X	$50.0		F/A	Air Quality Control Program to study the establishment of an air quality control authority.

THE OFFICE OF WATER

The EPA together with state and local governments has responsibility for water quality in three areas. The first is reducing pollution of surface waters. The second is preventing contamination of ground waters needed for human consumption. The final area concerns maintaining the purity of drinking water. EPA and states also implement programs to protect ground water quality authorized under several different statutes and described in the recently published ground water strategy.

Authority to implement these programs comes from three major statutes. They are as follows:

- Safe Drinking Water Act (SDWA)
- Clean Water Act (CWA)
- Marine Protection, Research, and Sanctuaries Act (MPRSA)

Objectives of the major statutes are:

- (SDWA) Ensure that drinking waters are free from harmful contaminants and protect ground water from contamination by underground injection.
- (CWA) Restore and maintain the chemical, physical, and biological integrity of the nation's water.
- (MPRSA) Provide for the safe and effective disposal of dredged materials, sewage sludge, hazardous waste, and other materials at sea. (This statute does not directly relate to American Indian tribes or tribal government authorities.)

The Ground Water Protection Strategy, though not a statute, supports states in development and implementation of ground water protection programs. It also provides a common policy basis for all EPA Ground Water Program activities.

The Safe Drinking Water Act establishes two programs through which the EPA can fulfill its mandate of ensuring that drinking waters are free from harmful contaminants. The first one is the Public Water Supply Supervision Program. This Program focuses on providing safe drinking water to users of Public Water Systems. This Program is currently the most active on Indian reservations today according to the reports received from the regions. The Act also established a second Program, the Undergound Injection Control Program (UIC) to protect groundwater supplies that are or might be sources of drinking water from contamination by subsurface placement of fluids by well operators.

The Clean Water Act provides a comprehensive structure for water pollution control. The Act provides for establishment of technology-based and water quality-based controls for sources of pollutants, state water quality standards to protect water uses, monitoring to assess water conditions and trends, and water quality management (WQM) planning to analyze problems and design needed control measures.

In addition EPA and state agencies implement a permit and enforcement program for municipal and industrial discharges, including indirect sources. A third key program authorized by the Act provides for grants to communities for construction of waste water treatment facilities to improve water quality.

EPA provides program management grants to state agencies under both the the Safe Drinking Water Act and the Clean Water Act. Under the SDWA funds are available for both the Public Water System Supervision Program and the Underground Injection Control Program. Under CWA funds are provided for in section 106, state administration of water pollution control programs; section 205(g), state management of the construction grant program; and section 205(j) state water quality management plans.

Descriptions of technical and financial assistance programs available from the Office of Water as stated in the Office of Management and Budget's June 1984 Catalog of Federal Domestic Assistance are as follows:

	PROGRAM DESCRIPTION	FINANCIAL	NON-FINANCIAL
66.418	CONSTRUCTION GRANTS FOR WASTEWATER TREATMENT WORKS	*	
66.419	WATER POLLUTION CONTROL - STATE AND INTERSTATE PROGRAM GRANTS.......	*	
66.423	WATER QUALITY CONTROL INFORMATION SYSTEM - ORIENTATION/TRAINING SEMINARS, DATA AND MONITORING PUBLICATIONS..................		*
66.432	STATE PUBLIC WATER SYSTEMS SUPERVISION PROGRAM GRANTS................	*	
66.433	STATE UNDERGROUND WATER SOURCE PROTECTION GRANTS.........................	*	
66.438	CONSTRUCTION MANAGEMENT ASSISTANCE GRANTS.	*	
66.454	WATER QUALITY MANAGEMENT PLANNING........	*	
66.455	MARINE COMBINED SEWER OVERFLOW SPECIAL FUND..............................	*	

SUMMARY OF CURRENT EPA-ASSISTED WATER PROGRAMS

OCCURRING ON INDIAN RESERVATIONS

CLEAN WATER ACT PROGRAMS

REGION	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	$718.9		F/A	Step 2/3 grant for design and construction of 23 subsurface wastewater disposal systems.

THE OFFICE OF WATER CLEAN WATER ACT PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
II	N/A	N/A	N/A	No current CWA Programs reported.
III	See footnote on page 11			
IV	$1.2 FTE	0.15	T/A	Environmental engineering, consultation, and facility inspection. (Compliance Evaluation Inspection) This includes three visits to several tribes.
		0.03	Outreach	Site visits and phone calls.
V	$65.8		F/A	Section 314, Clean Lakes Grant phase 1 diagnostic feasibility study. Provides for research to gather data on four tribal lakes and their watersheds and development of management plans for each lake.
	$41.0		F/A	Construction Grant for a Wastewater Treatment Facility.
		0.1	T/A	Developing NPDES permits to correct existing pollution problems. Working with reservation representatives to establish wastewater treatment facility and training operators.
		0.1	D/I	Draft public notice and prepare NPDES permits for issuance.
VI	$168.4		F/A	Acomita Clean Lakes Demonstration Project.
VII	$476.3		F/A	Construction Grant for Wastewater Treatment Facility.
		minor	T/A	Issuance of NPDES permits for treated wastewater effluent discharge on several reservations. Disagreement with the State of Iowa over permitting authority.

THE OFFICE OF WATER CLEAN WATER ACT PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VIII	N/A	N/A	N/A	No current CWA programs reported.
IX		MINOR	T/A	Technical assistance provided to the Hoopa Valley Indian Tribe in their preparation of a proposal for a section 205(j) CWA Grant.
		0.5	T/A	On-going two year study to state on effects of Reno/Sparks Wastewater Treatment Facility.
		0.15	T/A	Provide technical guidance to the Pyramid Lakes Paiute Tribe as they develop a WQS for water on their reservation. Technical review of standards if adopted.
		0.01 Per finding	D/I	Findings of violations and orders issued.
X	$100.0		F/A	Water Quality Management Program to develop tribal resolutions to control current and potential sources of water pollution.
	$220.0		F/A	Water Quality Management Planning to implement tribal resolutions to control current and potential sources of water pollution.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - UIC

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II	$.05	0.2	T/A	Development of UIC Program, including permits, for tribes.

ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS - FY'85

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - UIC

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
III	See footnote on page 11			
IV	N/A	N/A	N/A	No current UIC Programs reported.
V	$5.0	.1* (Contract Employee)	Outreach	Minnesota Rural Water Association (MRWA) is providing general information on the UIC program to water plant operators. This is being done in connection with the Circuit Rider program discussed on page 17.
VI	$126.6	16.0 (Contract Employee)	D/I	Underground Injection Control UIC Program class II oil and gas brine injection wells (Cooperative Agreement Grant) w/the Usage Tribe in Oklahoma.
	$10.5	1.0	D/I	A joint UIC Program is being developed between Regions 6, 8 and 9 for Navajo Reservation and between Regions 6 and 8 for Mountain Ute Reservation. A UIC program is also being developed for the remainder of the Indian lands in Oklahoma and New Mexico.
VII	N/A	N/A	N/A	No current UIC Programs reported.
VIII		0.01	T/A	Minimum technical assistance provided to Indians. Major assistance provided to well operators. Advice is given to help protect tribal aquifers.
	$60.0	MINOR	T/A	Provide technical assistance on the UIC Program requirements for Northern Ute. There currently is no UIC Program for Indian tribes in Utah. This assistance is given to the Ute tribe only.
	$1.3	0.03	Outreach	Annual CERT presentation about the UIC Program . Information is sent to six states through mail and telephone communication.
		0.11	D/I	Direct implementation activities in Montana mainly impact well operators who are working on wells on Indian lands.
		0.03	D/I	All major UIC activities on Ute MT., Ute land that were specifically deleted from Colorado Indian Program are undertaken by the region. This program development is done in coordination with the joint Navajo Program occurring amongst regions *6,8,& 9.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - UIC

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VIII		0.32	D/I	Activites in North Dakota involve program development for the Fort Berthold reservation.
		0.2	D/I	There is a personnel commitment in the region to assist in UIC Program development.
IX			D/I	A portion of one person's time is devoted to program development. The main activity is coordinating with regions *6,8 & 9 on the Navajo Program development.
X	N/A	N/A	N/A	No current UIC Programs reported.

* Includes Osage tribal and EPA employees (11.0 EPA person years).

SAFE DRINKING WATER PROGRAMS - PWSS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II	$7.6	.1	F/A	Two grants to the State to monitor and test public water supply quality.
III	See footnote on page 11			
IV	$18.2	0.3	T/A	Technical assistance is provided in the forms of personnel visits, contract training, telephone contact, and training by water supply personnel.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - PWSS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
	$.03	0.02	T/A	Technical evaluation/certification of Cherokee Indian Reservation Drinking Water Laboratory.
		0.1	Outreach	Annual meetings are held with Indian Health Service, all Region IV tribes, and EPA representatives for the purpose of discussing on-going activities.
		0.2	D/I	Enforcement activities have been taken against five community water systems on the Cherokee Reservation. Compliance reports are also completed annually to ensure full compliance.
V	$53.0	.9 (Contract Employee)	F/A	Reservation Technical Assistance Project. Grant given to Minnesota Rural Water Association. A circuit rider is provided to visit all Indian Community Water Systems annually. Technical assistance and information is provided.
			T/A	The grant listed above, provides for a circuit rider advising operators on how to manage community water systems.
	$.7	.02	Outreach	Outreach activities include the publication of O&M Serviceline. The region participates in workshops. Both drinking water and UIC are presented.
	$2.0	1.0 (Contract Employee)	D/I	Money is allocated to do analysis and to provide for travel.
	$23.0		F/A	A grant with the Minnesota Rural Water Association provides the development and distribution of a water plant operator's manual.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - PWSS

REGIONS	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
V		0.25	D/I	Sanitary surveys are conducted at public water supplies by Region V staff. They collect radiological and inorganic chemical samples.
VI	$12.0	0.9	T/A	Interagency Agreement with Indian Health Service for Operation and Maintenance (O&M) and Sample Collection training for Apache and Pueblo Public Water System Operators in New Mexico. Includes classroom and on-the-job training with follow-up visits. The goal is to have the Apaches and Pueblos assume all their responsibilities under the SDWA.
	$13.5	0.1	F/A	Agreements with 4 laboratories in New Mexico provide analysis of water samples from Apache and Pueblo Public Water Systems. This is done to phase in the burden of assumption of monitoring responsibilities by the Apaches and Pueblos.
VII	$5.2		F/A	Public Water Supply Grants to Iowa Rural Water Association, Kansas Department of Health and Environment and Nebraska Department of Health.
	$5.0		F/A	Interagency agreement with Indian Health Service. EPA/IHS will jointly sponsor two training courses for tribal water supply operators.
VIII	$2.0		T/A	To follow up on a prior effort in which a sanitary engineer from IHS visited a reservation to provide O&M training leading to operator cerification and the production of O&M manuals.
	$7.0		T/A	This funding will start providing O&M training to Indian water system operators. The EPA has not supported O&M training in Montana for several years. This is an interagency agreement with IHS which was superceded by an HQ Office of Drinking Water training project.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - PWSS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VIII	$27.0		T/A	This is an on-going grant to the South Dakota Section of the American Water Works Association to provide a trainer to travel around to the Indian reservations to give hands-on O&M training for the Indian water system operators.
	$35.0	0.15	T/A	Water System operator training for Indian operators; development of operation and maintenance manuals for Indian systems. This is an interagency agreement between EPA/IHS
	$5.0		D/I	IHS will run a circuit of about 50 Indian water systems on different reservations to collect special samples and ship them to the region for analysis.
			D/I	EPA staff perform sanitary surveys in CO, UT, MT, and WY. The purpose of this survey is to document facility conditions, discover technical assistance needs, and update inventory.
		0.5	D/I	Direct implementation activities not covered elsewhere are performed by Region VIII staff. These include tracking and monitoring of and compliance by water systems with national drinking water regulations and some technical assistance and sanitary surveys. There has been little enforcement activity to date.
	—	0.04	D/I	The region occasionally expends funds for sanitary surveys but has no plans to do so in FY 85. IHS does some DI activities for the region at no extra cost.
IX	$30.0		F/A	EPA awarded this grant to the Navajo Nation to assist the tribe in assuming partial responsibility for this program.
	$15.0		F/A	EPA awarded this grant to the Papago tribe to develop a strategy to meet the requirements of the SDWA.

THE OFFICE OF WATER THE SAFE DRINKING WATER PROGRAMS - PWSS

REGION	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
IX	$10.0		F/A	EPA awarded through an interagency agreement with IHS to the White Mountain Apache Tribe for O&M data and training.
	$10.0		F/A	EPA awarded through an interagency agreement with IHS a grant to the Hoopa Valley Public Utility District to conduct an operator training class for Indian water systems operators.
	$12.0		F/A	EPA awarded through an interagency agreement with IHS, a grant to an Indian organization to assist in formation of a utility district for several small water systems in North California. They will assist the district in accessing funds for capital improvements in the systems.
	$18.0	0.5 Contract	T/A	Operator training classes. (Regions VI and VIII also involved)
		0.2	T/A	Sanitary surveys and inspection reports (Regions VI and VIII also involved)
		0.2	T/A	Plan and specification review. (Regions VI and VIII also involved)
	$20.0		T/A	EPA awarded through an interagency agreement with IHS. Provides for the compilation of site-specific O&M manuals. (Region VI and VIII also involved)
	$30.0		T/A	Field technician position. EPA awarded through an interagency agreement with IHS. This funded the salary for an O&M advocate.
	$1.0		Outreach	EPA environmental engineers visit many of the individual water systems and meet with operators of these systems. They also meet with the tribal officials to negotiate compliance agreements and discuss concerns.

THE OFFICE OF WATER SAFE DRINKING WATER PROGRAMS - PWSS

REGION	($000) EXPENDITURES	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
IX			D/I	The region tracks compliance with the SDWA for over 400 public water systems. Results sent to EPA where they are logged and tracked.
		2.0	D/I	Public Water Supply Direct Implementation Program. (Enforcement)
X	$86.0	1.0	T/A	EPA awarded interagency agreement with IHS. This award provided technical assistance for drinking water systems maintenance/training.
HQ	$140.0	.2	F/A	This administers the Public Water Supply System Indian Lands Program. Headquarters analyzes compliance, tracks funds and implements an interagency agreement with the Indian Health Service which includes a fellowship fund set up to provide training to PWSS Indian operators.

THE OFFICE OF WATER GROUND WATER PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II	N/A	N/A	N/A	No current GWP reported.
III	See footnote on page 11			
IV	N/A	N/A	N/A	No current GWP reported.
V	N/A	N/A	N/A	No current GWP reported.
VI	N/A	N/A	N/A	No current GWP reported.
VII	N/A	N/A	N/A	No current GWP reported.
VIII	$2.1	0.01	T/A	Advice to Southern Ute on technical approach for ground water protection of their aquifer due to brine disposal.
	$.08	0.025	T/A	Ground water sampling advice concerning impacts possibly due to oil and gas production. A staff person assisted in a groundwater study at Turtle Mountain.
IX	N/A	N/A	N/A	No current GWP reported.
X	$.03	0.04	T/A	Ground water sampling in which samples were taken and analyzed for presence of pesticide residues.

ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS - FY'85

THE OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

The basic authorities for the Pesticides and Toxic Substances Control Programs are the Federal Insecticide, Fungicide, and Rodenticide Act and the Toxic Substances Control Act. Both Acts recognize the inherent risks to human health and the environment from pesticides and toxic chemicals and, at the same time, their numerous benefits.

In the Toxic Substances Program, a phased program to identify, evaluate and control the risks of existing chemicals has been established. There are currently over 60 chemicals in the evaluation stage, and risk management actions have been initiated on five chemicals; manufacturing and use restrictions have been developed, including used motor and leaking underground storage tanks. Control rules are also being developed for asbestos.

Under the FIFRA Program, EPA registers or licenses all pesticide products marketed or used in the U.S. EPA must approve any use of a pesticide before it may be marketed, and manufacturers must clearly state the conditions of that use on the label. Under FIFRA, the states have primary responsibility for enforcing Federal pesticide registration and use requirements. States may also establish EPA-approved pesticide applicator certification and training programs.

In 1986 attention will be given to increasing state and regional participation in the pesticides and toxic substances programs. Participation will be beyond the areas of ordinary participation, i.e., enforcement. There will be greater utilization of the states' and regions' knowledge of existing chemical and pesticide problems. In very complex and potentially burdensome control problems, states and regions will be consulted before final decisions are made. Finally, the regions will be increasingly relied upon for technical assistance to those affected by control programs. This new approach will increase the possibility of greater tribal involvement in these programs.

Description of technical and financial assistance programs available from the Office of Pesticides and Toxic Substances as stated in the Office of Management and Budget's Catalog of Federal Domestic Assistance are:

PROGRAM DESCRIPTION	FINANCIAL	NON-FINANCIAL
• 66.700 Pesticides Enforcement Grants...........	*	

THE OFFICE OF PESTICIDES AND TOXIC SUBSTANCE PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II	N/A	N/A	N/A	No current FIFRA or TSCA activities reported.
III	See footnote on page 11			

THE OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
IV		0.1	T/A	Advice on pesticide use/application, certification requirements for applicators using restricted use pesticides.*
V		0.7	T/A	Technical assistance on TSCA issues of concern to tribes including PCBs and health effects.
	IHS funded	.03	T/A	Technical assistance concerning health effects of asbestos; includes slide-shows, seminars and answering questions on removal or abatement of asbestos.
VI	N/A	N/A	T/A	Only minimal current FIFRA and TSCA activities with the Navajo nation.
VII	N/A	N/A	N/A	No current FIFRA or TSCA activities reported.
VIII	$140.5		F/A	There are six Pesticide Cooperative Enforcement Grants active in the region. They provide for pesticide applicator certification and enforcement programs.
		0.2	T/A	Inspector training, program information, joint enforcement if requested.
		0.3	T/A	Program oversight, pesticide use, and technical assistance. Efforts are underway to achieve tribal/state/EPA coordination. Enforcement training which involves pesticide problem identification.
		0.83	D/I	Pesticide enforcement on several reservations.

*All tribes except the Seminole have memoranda of understanding with state agencies giving the state authority to regulate certified applicators.

THE OFFICE OF PESTICIDES AND TOXIC SUBSTANCE PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
IX	$200.0		F/A	There are two active FIFRA Grants in the region.
	$1.0	0.00	T/A	FIFRA inspection training in field procedures, safety, evidence collection, and risk assessment.
		0.04	T/A	Assistance on clean-up procedures and regulatory compliance with TSCA PCB regulations. Working with tribe to develop a program to help bring them into compliance.
X	$18.0		F/A	Pesticide Enforcement Grant to help Shoshone-Bannock develop a pesticide enforcement program on the reservation.
HQ	$234.0		F/A	Interagency agreement with the Department of the Interior to aid in removing asbestos from Indian schools.

THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

The programs administered by the Office of Solid Waste and Emergency Response stem from the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). These two programs rank at the top of the agency's priorities for FY 1986 and FY 1987. EPA's goal in this area is to protect public health, welfare and the environment from past, present and future threats posed by hazardous wastes and substances.

FY 1986 will be the first full year of implementation of the RCRA Amendments of 1984. These amendments greatly expand the scope and authorities associated with the hazardous waste program.

The direction of RCRA and CERCLA Programs over the next several years will be greatly influenced by some fundamental issues that will affect their course. One issue that will affect their direction is the importance of ground water protection. Both of these programs are critical in the effort to prevent contamination of ground water. During the next few years concern for ground-water will be the foundation of both RCRA and CERCLA's policies and implementation activities. While the RCRA Amendments of 1984 require corrective action for releases into all media, EPA's and states' initial concentration will be on releases into ground water. Under RCRA and CERCLA, EPA and states now have a full range of enforcement and permitting authorities to achieve sound environmental results, especially where ground water is concerned.

EPA's goals in implementing RCRA are to establish and implement a sound and effective regulatory program and ensure that hazardous waste handlers comply with those requirements. Issuing facility-specific permits is the heart of the RCRA program. One of the biggest challenges facing the EPA today is issuing permits. Today's permit decisions set legal precedent. Therefore, careful legal review is required before making these decisions. Once a precedent is set, decisions in simiiiar situations can be fully delegated to program managers.

In implementing the CERCLA program, EPA and the states began a concentrated effort to identify all uncontrolled hazardous sites. Once identified these sites are subject to a series of steps to determine whether the site presents a hazard and, if so, what clean up actions are appropriate. The most serious sites are placed on the National Priorities List (NPL) and thus become eligible for long-term remedial action.

Descriptions of technical and financial assistance programs available from the Office of Solid Waste and Emergency Response as stated in the Office of Management and Budget's Catalog of Federal Domestic Assistance are:

	PROGRAM DESCRIPTION	FINANCIAL	NON FINANCIAL
* 66.801	HAZARDOUS WASTE MANAGEMENT FINANCIAL ASSISTANCE TO STATES..................	*	
* 66.802	HAZARDOUS SUBSTANCE RESPONSE TRUST FUND.	*	

THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

RCRA PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II		N/A	N/A	No active RCRA Programs reported.
III	See footnote on page 11			
IV	N/A	N/A	N/A	No active RCRA Programs reported.
V	$40.0	.02	T/A	Laboratory support provided in which some RCRA analysis was performed.
	$67.3		F/A	Hazardous and Solid Waste Program Development Project. Developing a program for managing solid and hazardous waste on the reservation. This includes: how the program will relate to other existing programs on and off the reservation. The final product will be tribal rules and a federal/state/tribal agreement governing implementation.
		0.2	T/A	State and federal staff are providing guidance to a tribe to develop the Hazardous and Solid Waste Program mentioned above. They are providing guidance and regulatory interpretation to the tribe. The state, at tribal request, inspects existing landfills and dumps on the reservation.
	$38.5 contract	0.24 contract	T/A	Development of a hazardous waste management plan. Also reviewing "Solid Waste Management on Indian Reservations". Monitoring RCRA related activities so as to develop a hazardous waste management plan for the reservation.
	$1.5	0.06		Technical assistance and support for tribal Waste Management Program.

THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

RCRA PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VI	N/A	N/A	N/A	No active RCRA Programs reported
VII	N/A	N/A	N/A	No active RCRA Programs reported
VIII	$28.1	0.5	T/A	Solid and hazardous waste managment training to selected Region VIII Indian reservations. A contractor of the International Environmental Consultants provided solid waste technical assistance training and interpretations of the regulations.
	$.05 per trip	0.02	Outreach	This includes information dissemination, phone calls and three visits a year.
IX	N/A	N/A	N/A	No active RCRA Programs reported
X	N/A	N/A	N/A	No active RCRA Programs reported

THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

CERCLA PROGRAMS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
I	See footnote on page 11			
II		0.02	D/I	GM Foundry Massena NY Superfund site (border of St. Regis Mohawk reservation) enf. case - GM has agreed to do RI/FS.
III	See footnote on page 11			
IV	N/A	N/A	N/A	No active CERCLA Programs.
V	N/A	N/A	N/A	No active CERCLA Programs.
VI	N/A	N/A	N/A	No active CERCLA Programs.
VII	N/A	N/A	N/A	No active CERCLA Programs.
VIII	N/A	N/A	N/A	No active CERCLA Programs.
IX	$20.0	0.3	T/A	Material and technical assistance in dealing with hazardous material emergencies.
		0.1	T/A	Case-by-case basis on Superfund related projects. They provide CERT with a list of potential sites near Indian reservations in region IX. They respond to any request for assistance as are received. They work with the Navajo to put unique uranium sites on the National Priority List.
	$500.0	1.05	D/I	There is one Indian NPL site on the Hoopa Indian reservation. There is another possible site on the Navajo reservation.
	$475.0	0.2	D/I	CERCLA immediate removal actions.
X	N/A	N/A	N/A	No active CERCLA Programs

THE OFFICE OF EXTERNAL AFFAIRS
Office of Federal Activities

Within the Office of External Affairs, the Office of Federal Activities (OFA) is responsible for establishing effective liaison and coordination between EPA and other federal agencies on environmental issues and for working with those agencies to assure that they carry out their activities in an environmentally sound manner; for assuring that EPA's programs comply with the goals and requirements of the National Environmental Policy Act (NEPA) and related environmental legislation; for administering EPA's program under section 404 of the Clean Water Act; and for coordinating implementation of EPA's programs related to protection of human health and the environment on Indian reservations. OFA's programs are multimedia in nature and consider impacts on natural resources and environmental values, as well as on public health.

The objectives of EPA's Indian program are (1) to strengthen EPA program coverage on Indian reservations in order to restore and protect environmental quality, and (2) to assist tribal governments in developing the necessary infrastructure and technical skills to assure maintenance of environmental quality in the future.

OFA's program is directed to coordinating the agency's efforts in working to ensure that our programs can be implemented on Indian reservations. These efforts include statutory amendments, regulatory changes, policy statements, and increased emphasis on Indian needs in the program and fiscal planning processes. The office is also coordinating some of the national initiatives that will assist in this process, e.g., a national environmental survey of Indian reservations and a contract to assist the regional offices in providing technical assistance to tribal governments. In addition, support and guidance are given to the regions, where tribal liaison is coordinated by regional Indian coordinators.

While OFA does not have funding for specific grant programs, some funds have been made available to support the Indian program. Where these funds have been directly utilized by a region, e.g., for a pilot project, they are reported for that region under the relevant media program. The one exception is a multi-media pilot project in Region VIII, which was jointly funded by OFA and the region. We are reporting that project here since it does not fit into the media format of this report.

SUMMARY OF CURRENT EPA ASSISTED MULTI-MEDIA PROGRAMS OCCURRING ON INDIAN RESERVATIONS

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
VIII	$183.0		F/A	Development of a multi-media program capability on an Indian reservation.
All	$110.0		F/A	National survey of environmental conditions on Indian reservations

THE OFFICE OF EXTERNAL AFFAIRS
Office of Federal Activities

REGION	($000) EXPENDITURE	PERSON YEARS	TYPE OF ASSISTANCE	PROGRAM DESCRIPTION
ALL	$250.0		T/A	Funding was provided to the Council of Energy Resource Tribes to supplement regional efforts in providing technical assistance to tribes.

It should be noted that OFA has approximately 2.0 person years devoted to implementation of the Indian program.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
EXTERNAL AFFAIRS

INDIAN POLICY
U.S. ENVIRONMENTAL PROTECTION AGENCY

Attached are two documents which were adopted by the Environmental Protection Agency (EPA) on November 8, 1984, relating to Indian Tribes and Federal programs for protection of reservation environments:

1) EPA Policy for the Administration of Environmental Programs on Indian Reservations.

2) Indian Policy Implementation Guidance.

These documents lay the groundwork for EPA management of the Agency's regulatory programs on reservation lands. The cornerstones of the Policy and Guidance are the principles of Indian "self-government" and "government-to-government" relations between the Federal Government and Tribal Governments. Through implementation of the Policy, the Agency hopes to realize the long-range objective of including Tribal Governments as partners in decision-making and program management on reservation lands, much as we do with State Governments off-reservation.

In the beginning, implementation of the Policy will be slowly paced, as the Agency will need to seek legislative authority in many areas and go through a lengthy budget process before we can carry out the principles of the Policy and directives of the Guidance in a comprehensive manner. In the first year, however, we will begin to seek statutory changes, modify regulations, and work on selected pilot programs. These pilot programs will investigate problems associated with Tribal regulation of water and air quality and the handling and disposal of hazardous materials on reservation lands. The experience will help both EPA and the Tribes develop models for dealing with these problems in the special legal and political context of Indian reservations.

Environmental programming that will involve Tribal Governments in the Federal regulatory process on a significant scale is a new endeavor for EPA and Tribes alike. To be successful, we will need cooperation and assistance from all sectors and would welcome your on-going support.

If you have questions or need further information, please contact Leigh Price, National EPA Indian Coordinator, at (202) 382-5051.

Attachment

EPA POLICY FOR THE ADMINISTRATION OF ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS

INTRODUCTION

The President published a Federal Indian Policy on January 24, 1983, supporting the primary role of Tribal Governments in matters affecting American Indian reservations. That policy stressed two related themes: (1) that the Federal Government will pursue the principle of Indian "self-government" and (2) that it will work directly with Tribal Governments on a "government-to-government" basis.

The Environmental Protection Agency (EPA) has previously issued general statements of policy which recognize the importance of Tribal Governments in regulatory activities that impact reservation environments. It is the purpose of this statement to consolidate and expand on existing EPA Indian Policy statements in a manner consistent with the overall Federal position in support of Tribal "self-government" and "government-to-government" relations between Federal and Tribal Governments. This statement sets forth the principles that will guide the Agency in dealing with Tribal Governments and in responding to the problems of environmental management on American Indian reservations in order to protect human health and the environment. The Policy is intended to provide guidance for EPA program managers in the conduct of the Agency's congressionally mandated responsibilities. As such, it applies to EPA only and does not articulate policy for other Agencies in the conduct of their respective responsibilities.

It is important to emphasize that the implementation of regulatory programs which will realize these principles on Indian Reservations cannot be accomplished immediately. Effective implementation will take careful and conscientious work by EPA, the Tribes and many others. In many cases, it will require changes in applicable statutory authorities and regulations. It will be necessary to proceed in a carefully phased way, to learn from successes and failures, and to gain experience. Nonetheless, by beginning work on the priority problems that exist now and continuing in the direction established under these principles, over time we can significantly enhance environmental quality on reservation lands.

POLICY

In carrying out our responsibilities on Indian reservations, the fundamental objective of the Environmental Protection Agency is to protect human health and the environment. The keynote of this effort will be to give special consideration to Tribal interests in making Agency policy, and to insure the close involvement of Tribal Governments in making decisions and managing environmental programs affecting reservation lands. To meet this objective, the Agency will pursue the following principles:

1. THE AGENCY STANDS READY TO WORK DIRECTLY WITH INDIAN TRIBAL GOVERNMENTS ON A ONE-TO-ONE BASIS (THE "GOVERNMENT-TO-GOVERNMENT" RELATIONSHIP), RATHER THAN AS SUBDIVISIONS OF OTHER GOVERNMENTS.

EPA recognizes Tribal Governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with Tribal Governments as the independent authority for reservation affairs, and not as political subdivisions of States or other governmental units.

2. THE AGENCY WILL RECOGNIZE TRIBAL GOVERNMENTS AS THE PRIMARY PARTIES FOR SETTING STANDARDS, MAKING ENVIRONMENTAL POLICY DECISIONS AND MANAGING PROGRAMS FOR RESERVATIONS, CONSISTENT WITH AGENCY STANDARDS AND REGULATIONS.

In keeping with the principle of Indian self-government, the Agency will view Tribal Governments as the appropriate non-Federal parties for making decisions and carrying out program responsibilities affecting Indian reservations, their environments, and the health and welfare of the reservation populace. Just as EPA's deliberations and activities have traditionally involved the interests and/or participation of State Governments, EPA will look directly to Tribal Governments to play this lead role for matters affecting reservation environments.

3. THE AGENCY WILL TAKE AFFIRMATIVE STEPS TO ENCOURAGE AND ASSIST TRIBES IN ASSUMING REGULATORY AND PROGRAM MANAGEMENT RESPONSIBILITIES FOR RESERVATION LANDS.

The Agency will assist interested Tribal Governments in developing programs and in preparing to assume regulatory and program management responsibilities for reservation lands. Within the constraints of EPA's authority and resources, this aid will include providing grants and other assistance to Tribes similar to that we provide State Governments. The Agency will encourage Tribes to assume delegable responsibilities, (i.e. responsibilities which the Agency has traditionally delegated to State Governments for non-reservation lands) under terms similar to those governing delegations to States.

Until Tribal Governments are willing and able to assume full responsibility for delegable programs, the Agency will retain responsibility for managing programs for reservations (unless the State has an express grant of jurisdiction from Congress sufficient to support delegation to the State Government). Where EPA retains such responsibility, the Agency will encourage the Tribe to participate in policy-making and to assume appropriate lesser or partial roles in the management of reservation programs.

4. THE AGENCY WILL TAKE APPROPRIATE STEPS TO REMOVE EXISTING LEGAL AND PROCEDURAL IMPEDIMENTS TO WORKING DIRECTLY AND EFFECTIVELY WITH TRIBAL GOVERNMENTS ON RESERVATION PROGRAMS.

A number of serious constraints and uncertainties in the language of our statutes and regulations have limited our ability to work directly and effectively with Tribal Governments on reservation problems. As impediments in our procedures, regulations or statutes are identified which limit our ability to work effectively with Tribes consistent with this Policy, we will seek to remove those impediments.

5. THE AGENCY, IN KEEPING WITH THE FEDERAL TRUST RESPONSIBILITY, WILL ASSURE THAT TRIBAL CONCERNS AND INTERESTS ARE CONSIDERED WHENEVER EPA'S ACTIONS AND/OR DECISIONS MAY AFFECT RESERVATION ENVIRONMENTS.

EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations.

6. THE AGENCY WILL ENCOURAGE COOPERATION BETWEEN TRIBAL, STATE AND LOCAL GOVERNMENTS TO RESOLVE ENVIRONMENTAL PROBLEMS OF MUTUAL CONCERN.

Sound environmental planning and management require the cooperation and mutual consideration of neighboring governments, whether those governments be neighboring States, Tribes, or local units of government. Accordingly, EPA will encourage early communication and cooperation among Tribes, States and local governments. This is not intended to lend Federal support to any one party to the jeopardy of the interests of the other. Rather, it recognizes that in the field of environmental regulation, problems are often shared and the principle of comity between equals and neighbors often serves the best interests of both.

7. THE AGENCY WILL WORK WITH OTHER FEDERAL AGENCIES WHICH HAVE RELATED RESPONSIBILITIES ON INDIAN RESERVATIONS TO ENLIST THEIR INTEREST AND SUPPORT IN COOPERATIVE EFFORTS TO HELP TRIBES ASSUME ENVIRONMENTAL PROGRAM RESPONSIBILITIES FOR RESERVATIONS.

EPA will seek and promote cooperation between Federal agencies to protect human health and the environment on reservations. We will work with other agencies to clearly identify and delineate the roles, responsibilities and relationships of our respective organizations and to assist Tribes in developing and managing environmental programs for reservation lands.

8. THE AGENCY WILL STRIVE TO ASSURE COMPLIANCE WITH ENVIRONMENTAL STATUTES AND REGULATIONS ON INDIAN RESERVATIONS.

In those cases where facilities owned or managed by Tribal Governments are not in compliance with Federal environmental statutes, EPA will work cooperatively with Tribal leadership to develop means to achieve compliance, providing technical support and consultation as necessary to enable Tribal facilities to comply. Because of the distinct status of Indian Tribes and the complex legal issues involved, direct EPA action through the judicial or administrative process will be considered where the Agency determines, in its judgment, that: (1) a significant threat to human health or the environment exists, (2) such action would reasonably be expected to achieve effective results in a timely manner, and (3) the Federal Government cannot utilize other alternatives to correct the problem in a timely fashion.

In those cases where reservation facilities are clearly owned or managed by private parties and there is no substantial Tribal interest or control involved, the Agency will endeavor to act in cooperation with the affected Tribal Government, but will otherwise respond to noncompliance by private parties on Indian reservations as the Agency would to noncompliance by the private sector elsewhere in the country. Where the Tribe has a substantial proprietary interest in, or control over, the privately owned or managed facility, EPA will respond as described in the first paragraph above.

9. THE AGENCY WILL INCORPORATE THESE INDIAN POLICY GOALS INTO ITS PLANNING AND MANAGEMENT ACTIVITIES, INCLUDING ITS BUDGET, OPERATING GUIDANCE, LEGISLATIVE INITIATIVES, MANAGEMENT ACCOUNTABILITY SYSTEM AND ONGOING POLICY AND REGULATION DEVELOPMENT PROCESSES.

It is a central purpose of this effort to ensure that the principles of this Policy are effectively institutionalized by incorporating them into the Agency's ongoing and long-term planning and management processes. Agency managers will include specific programmatic actions designed to resolve problems on Indian reservations in the Agency's existing fiscal year and long-term planning and management processes.

William D. Ruckelshaus

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 8 1984

OFFICE OF
THE ADMINISTRATOR

MEMORANDUM

SUBJECT: Indian Policy Implementation Guidance

FROM: Alvin L. Alm Alvin L. Alm
Deputy Administrator

TO: Assistant Administrators
Regional Administrators
General Counsel

INTRODUCTION

The Administrator has signed the attached EPA Indian Policy. This document sets forth the broad principles that will guide the Agency in its relations with American Indian Tribal Governments and in the administration of EPA programs on Indian reservation lands.

This Policy concerns more than one hundred federally-recognized Tribal Governments and the environment of a geographical area that is larger than the combined area of the States of Maryland, New Jersey, Connecticut, Massachusetts, Vermont, New Hampshire and Maine. It is an important sector of the country, and constitutes the remaining lands of America's first stewards of the environment, the American Indian Tribes.

The Policy places a strong emphasis on incorporating Tribal Governments into the operation and management of EPA's delegable programs. This concept is based on the President's Federal Indian Policy published on January 24, 1983 and the analysis, recommendations and Agency input to the EPA Indian Work Group's Discussion Paper, Administration of Environmental Programs on American Indian Reservations (July 1983).

TIMING AND SCOPE

Because of the importance of the reservation environments, we must begin immediately to incorporate the principles of EPA's Indian Policy into the conduct of our everyday business. Our established operating procedures (including long-range budgetary and operational planning activities) have not consistently focused on the proper role of Tribal Governments or the special legal and political problems of program management on Indian lands. As a result, it will require a phased and sustained effort over time to fully implement the principles of the Policy and to take the steps outlined in this Guidance.

Some Regions and Program Offices have already made individual starts along the lines of the Policy and Guidance. I believe that a clear Agency-wide policy will enable all programs to build on these efforts so that, within the limits of our legal and budgetary constraints, the Agency as a whole can make respectable progress in the next year.

As we begin the first year of operations under the Indian Policy, we cannot expect to solve all of the problems we will face in administering programs under the unique legal and political circumstances presented by Indian reservations. We can, however, concentrate on specific priority problems and issues and proceed to address these systematically and carefully in the first year. With this general emphasis, I believe that we can make respectable progress and establish good precedents for working effectively with Tribes. By working within a manageable scope and pace, we can develop a coordinated base which can be expanded, and, as appropriate, accelerated in the second and third years of operations under the Policy.

In addition to routine application of the Policy and this Guidance in the conduct of our everyday business, the first year's implementation effort will emphasize concentrated work on a discrete number of representative problems through cooperative programs or pilot projects. In the Regions, this effort should include the identification and initiation of work on priority Tribal projects. At Headquarters, it should involve the resolution of the legal, policy and procedural problems which hamper our ability to implement the kinds of projects identified by the Regions.

The Indian Work Group (IWG), which is chaired by the Director of the Office of Federal Activities and composed of representatives of key regional and headquarters offices, will facilitate and coordinate these efforts. The IWG will begin immediately to help identify the specific projects which may be ripe for implementation and the problems needing resolution in the first year.

Because we are starting in "mid-stream," the implementation effort will necessarily require some contribution of personnel time and funds. While no one program will be affected in a major fashion, almost all Agency programs are affected to some degree. I do not expect the investment in projects on Indian Lands to cause any serious restriction in the States' funding support or in their ability to function effectively. To preserve the flexibility of each Region and each program, we have not set a target for allocation of FY 85 funds. I am confident, however, that Regions and program offices can, through readjustment of existing resources, demonstrate significant and credible progress in the implementation of EPA's Policy in the next year.

ACTION

Subject to these constraints, Regions and program managers should now initiate actions to implement the principles of the Indian Policy. The eight categories set forth below will direct our initial implementation activities. Further guidance will be provided by the Assistant Administrator for External Affairs as experience indicates a need for such guidance.

1. THE ASSISTANT ADMINISTRATOR FOR EXTERNAL AFFAIRS WILL SERVE AS LEAD AGENCY CLEARINGHOUSE AND COORDINATOR FOR INDIAN POLICY MATTERS.

This responsibility will include coordinating the development of appropriate Agency guidelines pertaining to Indian issues, the implementation of the Indian Policy and this Guidance. In this effort the Assistant Administrator for External Affairs will rely upon the assistance and support of the EPA Indian Work Group.

2. THE INDIAN WORK GROUP (IWG) WILL ASSIST AND SUPPORT THE ASSISTANT ADMINISTRATOR FOR EXTERNAL AFFAIRS IN DEVELOPING AND RECOMMENDING DETAILED GUIDANCE AS NEEDED ON INDIAN POLICY AND IMPLEMENTATION MATTERS. ASSISTANT ADMINISTRATORS, REGIONAL ADMINISTRATORS AND THE GENERAL COUNSEL SHOULD

DESIGNATE APPROPRIATE REPRESENTATIVES TO THE INDIAN WORK GROUP AND PROVIDE THEM WITH ADEQUATE TIME AND RESOURCES NEEDED TO CARRY OUT THE IWG'S RESPONSIBILITIES UNDER THE DIRECTION OF THE ASSISTANT ADMINISTRATOR FOR EXTERNAL AFFAIRS.

The Indian Work Group, (IWG) chaired by the Director of the Office of Federal Activities, will be an important entity for consolidating the experience and advice of the key Assistant and Regional Administrators on Indian Policy matters. It will perform the following functions: identify specific legal, policy, and procedural impediments to working directly with Tribes on reservation problems; help develop appropriate guidance for overcoming such impediments; recommend opportunities for implementation of appropriate programs or pilot projects; and perform other services in support of Agency managers in implementing the Indian Policy.

The initial task of the IWG will be to develop recommendations and suggest priorities for specific opportunities for program implementation in the first year of operations under the Indian Policy and this Guidance.

To accomplish this, the General Counsel and each Regional and Assistant Administrator must be actively represented on the IWG by a staff member authorized to speak for his or her office. Further, the designated representative(s) should be afforded the time and resources, including travel, needed to provide significant staff support to the work of the IWG.

3. ASSISTANT AND REGIONAL ADMINISTRATORS SHOULD UNDERTAKE ACTIVE OUTREACH AND LIAISON WITH TRIBES, PROVIDING ADEQUATE INFORMATION TO ALLOW THEM TO WORK WITH US IN AN INFORMED WAY.

In the first thirteen years of the Agency's existence, we have worked hard to establish working relationships with State Governments, providing background information and sufficient interpretation and explanations to enable them to work effectively with us in the development of cooperative State programs under our various statutes. In a similar manner, EPA managers should try to establish direct, face-to-face contact (preferably on the reservation) with Tribal Government officials. This liaison is essential to understanding Tribal needs, perspectives and priorities. It will also foster Tribal understanding of EPA's programs and procedures needed to deal effectively with us.

4. ASSISTANT AND REGIONAL ADMINISTRATORS SHOULD ALLOCATE RESOURCES TO MEET TRIBAL NEEDS, WITHIN THE CONSTRAINTS IMPOSED BY COMPETING PRIORITIES AND BY OUR LEGAL AUTHORITY.

As Tribes move to assume responsibilities similar to those borne by EPA or State Governments, an appropriate block of funds must be set aside to support reservation abatement, control and compliance activities.

Because we want to begin to implement the Indian Policy now, we cannot wait until FY 87 to formally budget for programs on Indian lands. Accordingly, for many programs, funds for initial Indian projects in FY 85 and FY 86 will need to come from resources currently planned for support to EPA-and State-managed programs meeting similar objectives. As I stated earlier, we do not expect to resolve all problems and address all environmental needs on reservations immediately. However, we can make a significant beginning without unduly restricting our ability to fund ongoing programs.

I am asking each Assistant Administrator and Regional Administrator to take measures within his or her discretion and authority to provide sufficient staff time and grant funds to allow the Agency to initiate projects on Indian lands in FY 85 and FY 86 that will constitute a respectable step towards implementation of the Indian Policy.

5. ASSISTANT AND REGIONAL ADMINISTRATORS, WITH LEGAL SUPPORT PROVIDED BY THE GENERAL COUNSEL, SHOULD ASSIST TRIBAL GOVERNMENTS IN PROGRAM DEVELOPMENT AS THEY HAVE DONE FOR THE STATES.

The Agency has provided extensive staff work and assistance to State Governments over the years in the development of environmental programs and program management capabilities. This assistance has become a routine aspect of Federal/State relations, enabling and expediting the States' assumption of delegable programs under the various EPA statutes. This "front end" investment has promoted cooperation and increased State involvement in the regulatory process.

As the Agency begins to deal with Tribal Governments as partners in reservation environmental programming, we will find a similar need for EPA assistance. Many Regional and program personnel have extensive experience in working with States on program design and development; their expertise should be used to assist Tribal Governments where needed.

6. ASSISTANT ADMINISTRATORS, REGIONAL ADMINISTRATORS AND THE GENERAL COUNSEL SHOULD TAKE ACTIVE STEPS TO ALLOW TRIBES TO PROVIDE INFORMED INPUT INTO EPA'S DECISION-MAKING AND PROGRAM MANAGEMENT ACTIVITIES WHICH AFFECT RESERVATION ENVIRONMENTS.

Where EPA manages Federal programs and/or makes decisions relating directly or indirectly to reservation environments, full consideration and weight should be given to the public policies, priorities and concerns of the affected Indian Tribes as expressed through their Tribal Governments. Agency managers should make a special effort to inform Tribes of EPA decisions and activities which can affect their reservations and solicit their input as we have done with State Governments. Where necessary, this should include providing the necessary information, explanation and/or briefings needed to foster the informed participation of Tribal Governments in the Agency's standard-setting and policy-making activities.

7. ASSISTANT AND REGIONAL ADMINISTRATORS SHOULD, TO THE MAXIMUM FEASIBLE EXTENT, INCORPORATE TRIBAL CONCERNS, NEEDS AND PREFERENCES INTO EPA'S POLICY DECISIONS AND PROGRAM MANAGEMENT ACTIVITIES AFFECTING RESERVATIONS.

It has been EPA's practice to seek out and accord special consideration to local interests and concerns, within the limits allowed by our statutory mandate and nationally established criteria and standards. Consistent with the Federal and Agency policy to recognize Tribal Governments as the primary voice for expressing public policy on reservations, EPA managers should, within the limits of their flexibility, seek and utilize Tribal input and preferences in those situations where we have traditionally utilized State or local input.

We recognize that conflicts in policy, priority or preference may arise between States and Tribes as it does between neighboring States. As in the case of conflicts between neighboring States, EPA will encourage early communication and cooperation between Tribal and State Governments to avoid and resolve such issues. This is not intended to lend Federal support to any one party in its dealings with the other. Rather, it recognizes that in the field of environmental regulation, problems are often shared and the principle of comity between equals often serves the interests of both.

Several of the environmental statutes include a conflict resolution mechanism which enables EPA to use its good offices to balance and resolve the conflict. These procedures can be applied to conflicts between Tribal and State Governments that cannot otherwise be resolved. EPA can play a moderating role by following the conflict resolution principles set by the statute, the Federal trust responsibility and the EPA Indian Policy.

8. ASSISTANT ADMINISTRATORS, REGIONAL ADMINISTRATORS AND THE GENERAL COUNSEL SHOULD WORK COOPERATIVELY WITH TRIBAL GOVERNMENTS TO ACHIEVE COMPLIANCE WITH ENVIRONMENTAL STATUTES AND REGULATIONS ON INDIAN RESERVATIONS, CONSISTENT WITH THE PRINCIPLE OF INDIAN SELF-GOVERNMENT.

The EPA Indian Policy recognizes Tribal Governments as the key governments having responsibility for matters affecting the health and welfare of the Tribe. Accordingly, where tribally owned or managed facilities do not meet Federally established standards, the Agency will endeavor to work with the Tribal leadership to enable the Tribe to achieve compliance. Where reservation facilities are clearly owned or managed by private parties and there is no substantial Tribal interest or control involved, the Agency will endeavor to act in cooperation with the affected Tribal Government, but will otherwise respond to noncompliance by private parties on Indian reservations as we do to noncompliance by the private sector off-reservation.

Actions to enable and ensure compliance by Tribal facilities with Federal statutes and regulations include providing consultation and technical support to Tribal leaders and managers concerning the impacts of noncompliance on Tribal health and the reservation environment and steps needed to achieve such compliance. As appropriate, EPA may also develop compliance agreements with Tribal Governments and work cooperatively with other Federal agencies to assist Tribes in meeting Federal standards.

Because of the unique legal and political status of Indian Tribes in the Federal System, direct EPA actions against Tribal facilities through the judicial or administrative process will be considered where the Agency determines, in its judgment, that: (1) a significant threat to human health or the environment exists, (2) such action would reasonably be expected to achieve effective results in a timely manner, and (3) the Federal Government cannot utilize other alternatives to correct the problem in a timely fashion. Regional Administrators proposing to initiate such action should first obtain concurrence from the Assistant Administrator for Enforcement and Compliance Monitoring, who will act in consultation with the Assistant Administrator for External Affairs and the General Counsel. In emergency situations, the Regional Administrator may issue emergency Temporary Restraining Orders, provided that the appropriate procedures set forth in Agency delegations for such actions are followed.

9. ASSISTANT ADMINISTRATORS, REGIONAL ADMINISTRATORS AND THE GENERAL COUNSEL SHOULD BEGIN TO FACTOR INDIAN POLICY GOALS INTO THEIR LONG-RANGE PLANNING AND PROGRAM MANAGEMENT ACTIVITIES, INCLUDING BUDGET, OPERATING GUIDANCE, MANAGEMENT ACCOUNTABILITY SYSTEMS AND PERFORMANCE STANDARDS.

In order to carry out the principles of the EPA Indian Policy and work effectively with Tribal Governments on a long-range basis, it will be necessary to institutionalize the Agency's policy goals in the management systems that regulate Agency behavior. Where we have systematically incorporated State needs, concerns and cooperative roles into our budget, Operating Guidance, management accountability systems and performance standards, we must now begin to factor the Agency's Indian Policy goals into these same procedures and activities.

Agency managers should begin to consider Indian reservations and Tribes when conducting routine planning and management activities or carrying out special policy analysis activities. In addition, the IWG, operating under the direction of the Assistant Administrator for External Affairs and with assistance from the Assistant Administrator for Policy, Planning and Evaluation, will identify and recommend specific steps to be taken to ensure that Indian Policy goals are effectively incorporated and institutionalized in the Agency's procedures and operations.

INTERIM STRATEGY FOR IMPLEMENTATION OF THE EPA INDIAN POLICY

Office of Federal Activities
Office of External Affairs

November 1985

I. INTRODUCTION

The President issued a federal Indian Policy on January 24, 1983, supporting the primary role of tribal governments in matters affecting American Indian reservations. That policy stressed two related themes: (1) that the federal government will pursue the principle of Indian "self-government" and (2) that it will work directly with tribal governments on a "government-to-government" basis. On November 8, 1984, the Environmental Protection Agency (EPA) became the first federal agency to issue a policy pursuant to the President's policy.

There are 278 federally recognized Indian reservations in the United States, covering an area of approximately 87,000 square miles. This is equivalent to the land area of the New England States, plus New Jersey, Delaware, and Maryland. The population on these reservations as recorded in the 1980 census was about 700,000, with 49 percent of this population Indian.

Most reservations are governed by tribal governments, legally recognized by the United States as having executive, legislative, and judicial powers. Federal law applies on Indian reservations, but tribal law operates independently of, and in most cases to the exclusion of, state law. EPA's grant and regulatory programs, which are generally based upon the assumption that the states will implement EPA programs and enforce EPA standards, are deficient where the state lacks jurisdiction on Indian lands.

In order to ensure that the environmental protection provided by EPA's statutory mandates is provided for all people and geographic areas in the nation, it will be necessary to direct attention towards applying EPA programs to Indian reservations. While a certain level of activity has been occurring, it has been generally on an ad hoc basis. Difficulties also exist in terms of legislative and regulatory constraints.

This document presents a framework for directing agency actions in providing environmental protection to reservation lands. It supplements the Indian Policy and Implementation Guidance issued in November 1984, and provides a greater level of detail than that contained in the FY 86-87 Operating Guidance issued in February 1985. It is also intended as a guide to headquarters program offices and regional offices as they develop both workplans for FY 86 and operating guidance and budgets for FY 87. While the program will continue to be coordinated through the Office of Federal Activities in the Office of External Affairs, the ultimate success of the effort will depend upon the attention and priority placed upon these activities by the program and regional offices.

II. PROGRAM GOAL

The goal of the EPA Indian Program is to ensure environmental protection on American Indian reservations through implementation of EPA's authorities and programs.

While this program goal may appear on the surface to be self-evident, the unique status of reservation lands has resulted in a lack of attention to or, in other cases, a frustrated effort in working with tribal governments to protect their reservation environment.

Reservation lands are extremely diverse with regard to environmental quality and potential future threats from industrial and/or natural resource development. The level of employment and economic activity on most reservations is extremely low. Many tribes are beginning to exercise greater control over their reservations under the concept of self-sufficiency. Development of their resources will be critical to this effort, but also critical to their future will be development that occurs in an environmentally sound manner. Most tribal leaders are extremely concerned that resource development should not endanger the future integrity or quality of their homelands.

In addition to the potential environmental problems of resource development, the current problems that exist on many reservations include pollution resulting from historical resource use and the problems that occur in any rural, economically-deprived community. These are primarily water supply, sewage treatment, and solid waste disposal.

There are other federal agencies that have historically had major involvement with reservations, primarily the Bureau of Indian Affairs (BIA) and the Indian Health Service (IHS). These agencies can play a substantial role in assisting EPA and the tribal governments in efforts to implement environmental programs on reservation lands. Creative institutional and funding arrangements will be critical in developing programs that can be appropriately applied across the extremely diverse environmental, economic, and legal/institutional situations that occur among the reservations and their tribal governing structures.

III. PROGRAM OBJECTIVES

The following objectives are directed towards achievement of the Program Goal:

A. Directly apply EPA's authorities and programs on Indian reservations. The crucial first step in developing the Indian program is to ensure that, where now possible, EPA programs are implemented on reservation lands. The agency needs to develop better data concerning the nature and extent of environmental problems on reservations, in order to determine the future direction of the program and set priorities. Closer relationships need to be developed between EPA regional offices and tribal governments, as well as between EPA offices and their headquarters and field counterparts in BIA and IHS.

B. Develop and enhance tribal institutional capabilities to implement EPA's authorities and programs on reservation lands. From a practical standpoint it is neither desirable nor possible for EPA to directly manage all environmental programs on reservation lands. The capability of the tribes to manage their own environmental programs wholly or in participation with EPA needs to be developed, just as states have developed their capabilities through the years. With regard to tribes, we anticipate that a range of implementing options will develop. The diversity among the tribes in terms of size, resources, institutional capabilities, etc., is such that, while a limited number may develop full capability to manage environmental programs analogous to state programs, the majority will develop a capability focussed more directly on existing problems and depending more broadly on EPA's regulatory authorities. The development of multi-tribe and/or tribe-state relationships may also lead to the pooling of resources in order to provide environmental protection to reservation lands.

C. Eliminate legislative and regulatory barriers to program implementation (ranging from partial participation of the tribe to full delegation of programs to tribal governments). A number of serious constraints and uncertainties in the language of EPA's statutes and regulations have limited our ability to work directly and effectively with tribal governments on reservation problems. These constraints need to be addressed in such a manner that the agency can work with tribal governments with maximum flexibility. This flexibility is necessary because of the diversity among the tribes, and the recognition that a wide range of institutional options will best ensure that the Program Goal is met.

IV. CONSTRAINTS

In general, EPA programs have not been effectively applied on Indian reservations. The pledge to rectify this situation and to work directly with tribal leaders in implementing our programs as outlined in EPA's Indian Policy has been well received by the Indian community. There are a number of constraints, however, that need to be recognized and overcome if we are to successfully implement the program. Progress, even if slow, will have to be made to support the agency's good faith effort in issuing the policy and to maintain the credibility that we have gained with the Indian community.

The first major constraint is the availability of resources. EPA is dealing with level or decreased funding in most programs, both in terms of grant dollars available and personnel resources/travel dollars. The existing workload and grant dollar needs are met with difficulty. Since large new allocations of resources are unlikely, we will need to accommodate many of these needs within existing allocations. While this will be difficult in many cases, the effort must be made. Redirection of resources, at least in the short-term, will enable the agency to make steady, if limited, progress in this program.

The second major constraint, the subject of Program Objective C, is the legal barrier resulting from statutory and regulatory language. We need to ensure that existing laws, regulations, and policies are examined and amended as appropriate. Equally important, we need to ensure that new laws, regulations, and policies are responsive to the need for environmental programs on lands subject to tribal jurisdiction as well as lands subject to state jurisdiction.

This strategy has been developed in recognition of these constraints, and with the expectation that meaningful progress in implementing the Indian Program with tribal governments can be made despite the constraints. Priority attention will need to given to this matter, however, at both the headquarters and the regional level in order to ensure that this progress is made.

V. IMPLEMENTATION PLAN - FY 86/87

A. Directly apply EPA's authorities and programs on Indian resertions.

Despite existing constraints there are a number of activities that can be taken to apply EPA authorities and to facilitate future provision of these activities on Indian reservations.

1. Establish an information base. While it can be assumed that there is a considerable amount of existing environmental data in EPA offices, the offices of other federal agencies working with tribal reservations (BIA, IHS, BLM, OSM, etc.), tribal offices, and perhaps state offices, this information is not readily available. The magnitude of existing and potential environmental problems cannot be easily described and, without this data, it is difficult to effectively determine program direction and priorities. This information will also be extremely helpful in determining what level of resources will be necessary to effectively implement environmental programs on reservations.

(a) Conduct national survey. In FY 85 the Office of Federal Activities provided funding to Americans for Indian Opportunity, Inc., (AIO) for the purpose of conducting a national environmental survey on Indian reservations. This survey will include current environmental conditions of the reservation, the institutional capability that has been developed by the tribal government in response to any problems that have been identified, and potential problems or needs that are anticipated to occur in the future. Approximately 60 reservations will be surveyed, selected on the basis of size, population, and known problems. The survey is expected to be completed during the fourth quarter of FY 86. The House and Senate Appropriations Committees have already requested that the results be made available to them upon completion.

(b) Mechanism for maintaining the information base. The survey will result in environmental profiles of a number of reservations. It is important to develop a mechanism to ensure that this information can be kept current, thereby enabling easy access to the data in the future. These data will assist the agency in determining priorities over time as well as facilitate review over time of environmental conditions and programs on the reservations. Ideally this information should be available in computer files, as well as summarized periodically in tribal environmental status reports. OFA will develop a mechanism during FY 86, so that the information collected by AIO can be periodically updated in the future. If resources permit, a system will be developed to enable the data to be stored by computer for future retrieval, updating, and report generation.

(c) Maintain the information base. Once the mechanism has been developed, it will need to be implemented. This activity will be undertaken by the regions, with regional data bases created and a central base maintained by OFA.

2. Direct program activity by EPA. There will need to be an increasing level of effort each fiscal year until EPA's programs are effectively implemented where needed. These programs include, among others, public water supply system supervision, underground injection control programs, construction of wastewater treatment facilities, nonpoint source control programs, ground water protection, water quality standards, tribal air implementation plans, control of hazardous wastes, and emergency and remedial actions under the Superfund programs. Implementation of these programs will also change as statutory and regulatory barriers are identified and removed.

(a) Document on-going activities. While it has been apparent that there have been a number of activities occurring with Indian tribes, there has been no central documentation of this effort. Each program office and region has proceeded on an ad hoc basis. In FY 85 OFA contacted the program and regional offices to determine and document their FY 85 funding and personnel resources directed to tribal interests.

A draft of this report will be reviewed by each office, the final report to be published in the first quarter of FY 86. This information will provide a description of the level of effort currently being expended on tribal issues, and will also provide a base against which future activities can be measured.

(b) Set media program national objectives. Each media program will develop specific national objectives in terms of applying their programs on Indian reservations. These objectives, associated activities and commitments will be stated as part of the agency's Operating Guidance and included wherever possible in the overall agency Strategic Planning and Management System, of which the Operating Guidance is a part. Furthermore, each program must take definite steps to specify the resources that will be required to support these activities in both the agency operating and planning budgets. Of primary importance during this fiscal year is development of the Operating Guidance for FY 87-88, and development of the FY 88 planning budget. Attention to the budget process will certainly facilitate future program development, lessening the need to redirect already tight resources from other program needs. OFA will work with media program offices, the Office of Management Systems and Evaluation, and the Office of the Comptroller. In addition, OFA will continue to include the coordination of this program in its portions of the agency's Operating Guidance and budget process. In order to meet the Program Goal, however, an active lead must be taken by the program offices.

(c) Set regional priorities. Each region with Indian reservations not provided environmental services by state agencies (Regions 2, 4-10) should develop an annual strategy that outlines future activities to be undertaken in that region to meet the Program Goal and Program Objectives outlined in this document as they apply to the Indian reservations within that region. Each region will probably implement this program in a slightly different way, given the diversity among the tribes themselves as well as the differences among the regions. The strategies should also reflect national program objectives, and thus be prepared following issuance of the Operating Guidance each February.

3. Strengthen communication between EPA and tribal governments. While many of the tribes are aware that EPA has issued an Indian Policy, what that policy really means in terms of EPA programs and their application to reservation lands is not generally understood. Again, there is tremendous diversity among the tribes, with some wanting no contact with the agency and others already substantially involved in implementing environmental programs. The vast majority fall somewhere in between.

(a) Continue liaison with national tribal organizations. EPA has worked with such organizations as Americans for Indian Opportunity, Inc., the National Congress of American Indians, the National Tribal Chairmans' Association, and the Council of Energy Resource Tribes to provide information on EPA's Indian Policy and our implementation of it. These organizations provide a good forum for information transfer, and it is desirable to maintain effective relationships with them. OFA has historically taken the lead in the activity, with increasing awareness and activity being seen at the regional level.

(b) Tribal meetings. There is a need to make sure that Indian tribal leaders are aware of EPA's programs and how the agency operates in implementing these programs. The role of the regional office is critical in this activity, since the regional offices are the primary operating arm of the agency. This activity is especially sensitive since we need to work towards increasing tribal awareness of our programs while not raising false expectations. The regions must ensure that outreach activities with tribal governments at the least are at a level to ensure that the agency will be made aware of any critical needs that fall under our authorities. Senior regional staff will meet with tribal leaders (which ones to be determined by the region) individually or collectively at least once a year. In addition, the regional strategies discussed in Item I.2.(c) should outline the elements of an effective communication strategy to be implemented with the tribes.

(c) Technical workshops. There is a major need to provide technical assistance and training to tribal environmental staff to strengthen their capabilities in working with EPA. Recognizing that needs will vary among the tribes, the regions will identify those areas where technical workshops are appropriate, and sponsor annual individual media or multimedia workshops, as appropriate.

(d) Tribal/EPA agreements. As the agency increases its level of activity with tribal governments, it may prove desirable to specify what activities will occur on the reservation and what level of support will be provided by EPA, by the tribal government, or by mutually acceptable third parties (e.g., pursuant to agreements reached among tribes or between tribal and state agencies). The concept of these agreements is based on the state/EPA agreements that have been developed over the years, although the agreement should be tailored in scope and structure to each individual situation.

4. Develop relationships with other federal agencies. There are a number of other federal agencies that work with Indian tribes and whose programs have environmental ramifications. It is important that we coordinate our programs to optimize the total federal investment and to ensure that potential program conflicts can be identified and resolved.

(a) Indian Health Service. The Office of Drinking Water has an existing memorandum of understanding (MOU) with IHS, the purpose of which is to establish procedures to coordinate the activities of the two agencies in a manner that will continue to promote safe drinking water on Indian lands. This agreement is centered on Indian public water supply systems. It was signed in December 1984 and shall continue until one of the agencies decides to terminate it.

An umbrella MOU is being developed with IHS, which will broadly describe areas of overlap and areas that may be appropriate for more specific memoranda of understanding in the future. This effort is being coordinated by OFA, and the MOU will be ready for signature in the first quarter of FY 86.

A specific area of overlap that has already been identified is the construction of wastewater treatment facilities. Indian tribes have never been included in the EPA Needs Survey, and the Office of Water has committed to including them in the FY 86 survey. IHS has maintained an inventory of such needs, but the criteria for their survey are somewhat different from EPA's. The two agencies will work together in developing a tribal needs survey for municipal wastewater treatment. Funding wastewater treatment facilities and providing technical assistance to ensure adequate operation and maintenance of such facilities are also suitable areas for consideration of increased coordination.

(b) Bureau of Indian Affairs. BIA has an extensive involvement with Indian tribes, that ranges from direct provision of funding that can be used to match EPA program grants to being the responsible federal agency in complying with the National Environmental Policy Act when leases are let for natural resource development, e.g., forest or mineral leases. OFA will work with BIA during FY 86 to identify areas where increased cooperation and coordination would benefit provision of federal services and authorities to reservation lands. Regions are also encouraged to coordinate closely with area BIA offices.

(c) Other federal agencies. At this time we have not identified other federal agencies with which it would appear that development of MOUs at this time would be meaningful. Other levels of coordination do exist, however. The major activity in this area is the interagency contract, coordinated by the Department of Energy (DOE), with the Council of Energy Resource Tribes. Participating agencies are DOE, BIA, EPA, and the Administration for Native Americans (ANA). This contract has provided environmental technical assistance relating to energy projects, and has been expanded to provide a broader range of environmental assistance for both member and non-member tribes. Regional offices can access this contract in order to supplement the technical assistance that they provide to tribal governments (see Item V.B.2. technical assistance.)

B. Develop and enhance tribal institutional capability to implement EPA's programs on reservation lands.

Tribal participation in environmental programs will range from participation in EPA direct activities to partial delegation of program management to full delegation of program authorities. The specific role of any particular tribal government will depend on the degree to which the statute or implementing regulations provide for involvement, the institutional capability of the tribe to participate in the program, and the degree to which the tribe chooses to be involved based on resource availability and tribal priorities.

Through the years the agency has worked to establish working relationships with state governments, providing background information and sufficient interpretation and explanations to enable them to work effectively with us in the development of cooperative state programs under our various statutes. This process needs to be reinstituted with Indian tribes, with the recognition that most tribal governments are working in general to improve their institutional capabilities to govern.

1. Strengthen communication between EPA and tribal governments. See the discussion under Items V.A.3.(b) tribal meetings and (c) technical workshops.

2. Technical assistance. The regions will take the lead in providing technical assistance to tribal governments, with support from headquarters program offices and, where appropriate, the Office of Research and Development (ORD). This assistance can range from monitoring and survey support to programmatic support in developing ambient standards, public participation programs, workplans, etc. Broader environmental impact assessment support can also be provided to assess the potential impacts on the reservation of on- or off-reservation developments. Regions may also choose to work with third parties to provide technical assistance to tribes: inter-tribal groups, universities and colleges, or, as appropriate, state environmental agencies.

Supplemental support for the regions will be provided through a contract with the Council of Energy Resource Tribes. Procedures have been developed for regional use in accessing this contract. Assistance will include the assessment of environmental problems and the determination of the appropriate level of tribal institutional response, based upon available tribal resources and a consideration of alternative methods available to address existing or potential problems. Project areas include (a) development of environmental baseline inventories for Indian reservations, (b) development of guidelines as a precursor for promulgation of tribal environmental ordinances, (c) assisting tribal governments to develop programs to participate in EPA monitoring and regulatory programs, and (d) training and assisting tribal governments and technical staffs to understand the opportunities and constraints of instituting environmental control regulatory programs.

3. Training programs. EPA does not currently have a systematic view of training needs, and it will probably not be possible until FY 87 to undertake a study to identify training needs an opportunities for meeting those needs. However, there are activities that can be undertaken in the interim. For example, the Office of Drinking Water (ODW) has instituted a number of training programs, especially programs directed at the operation and maintenance of public water supply systems. Similar training needs can be assumed to exist with regard to sewage treatment and solid waste management. In all these areas coordination with the IHS will be of great use (see Item V.A.4.(a)). OFA, at the suggestion of ODW, is considering co-sponsoring with the media programs a pilot multimedia training program.

4. Optional institutional mechanisms. There is a tremendous diversity among the tribes relating to nature of environmental problem, resources available to address the problem, and the relative priority to the tribe as opposed to other competing tribal needs. We anticipate that a wide range of creative and flexible relationships will be developed to cost-effectively and soundly provide environmental protection to reservation lands. If resources allow, OFA will undertake to provide guidance that outlines optional institutional mechanisms for EPA/tribal/(state) relationships and general guidance as to when to apply them. Examples of such options include federal/tribal/state agreements for sharing technical assistance, standards, or enforcement authorities; tribal participation in direct EPA actions; circuit riders; tribal consortia; alternative delegation systems; and, full delegation.

5. Pilot projects. Four pilot projects were initiated in FY 85.

a. Region 5/Menominee Tribe - Wisconsin: This pilot is focussing on the development of tribal regulations, interagency agreements (federal/state/tribal/local) and recommendations for follow-up for hazardous waste/water quality programs.

b. Region 8/Three Affiliated Tribes at Fort Berthold - North Dakota: This pilot is a discrete portion of a broader project to develop a self-sustaining integrated environmental protection program.

c. Region 9/Navajo Nation - Arizona, New Mexico, and Utah: The focus of this pilot is the development of a tribal implementation program to ensure visibility standards.

d. Region 10/Confederated Colville Tribes - Washington: This pilot provides for implementation of the water quality management plan developed by the tribe under section 208 of the Clean Water Act.

The progress of these projects will need to be evaluated during FY 86, and the results disseminated to other tribal groups and EPA offices. An identification of problems encountered in implementation, the barriers encountered that prevented or limited the successes where that occurred, and the successes that came from the pilot projects will be critical in documenting the pilot efforts.

During the first quarter of FY 86 OFA will determine, in consultation with regional and program offices, the need for (a) additional support for existing pilot projects until program funds become available for tribal program support or (b) additional pilot projects. Two areas for consideration for additional pilots if resources permit would be (a) testing of alternative institutional mechanisms for managing environmental programs on reservations and (b) developing the institutional capabilities and effective mechanisms for smaller tribes.

6. Program grants. As the legislative and regulatory barriers are overcome, and with the assumption that some level of resources will become available, the agency will receive applications from tribal governments for program grants. Every effort must be made to ensure that resources do not handicap program implementation, recognizing that a gradual build-up in the number of tribes working with the agency is expected.

7. Construction grants. The Office of Water is working with IHS to determine tribal wastewater treatment needs. A process for allocating funds under a Clean Water Act allocation will be developed in FY 86 should the act be amended in this way.

C. Eliminate the statutory/regulatory barriers to program implementation

Most of the statutes, regulations, and policies implemented by EPA were developed with little or no consideration of implementation on Indian reservations. Tribes were generally either not discussed or were limited, e.g., by defining tribes as municipalities in the Clean Water Act they are eligible for wastewater treatment facility construction and clean lakes grants through state priority lists, but are not eligible for the broader programs of the act. The relationships between tribal and state governments vary widely, with some examples of effective cooperation and other examples of mutual refusal to cooperate. However, forcing tribal governments to act through state governments that cannot exercise jurisdiction over them is not an effective way of implementing programs overall, and certainly is in opposition to the federal policy of working with tribal governments directly.

1. Statutory amendments. Amendments to the Clean Water Act, the Safe Drinking Water Act, and the Comprehensive Environmental Response, Compensation and Liability Act are currently under consideration by the Congress. The CERCLA amendment provides for greater flexibility in funding remedial actions on Indian reservations. The Administration approach to amending the water acts, both of which have a number of sections that can affect Indian tribes, is to promulgate regulations within 18 months of enactment of the statute that will define how the tribes will be defined as states and how, where this is not appropriate, the Administrator will administer the act. We believe that this approach will also be appropriate for the Clean Air Act and the Resource Conservation and Recovery Act.

The development of the implementing regulations is the responsibility of the appropriate headquarters program office, and an extensive consultation process will need to be developed to ensure that tribal interests are identified and addressed. This is especially critical given the diverse nature of the tribes, and the need to have in-depth involvement of any affected community, in this case tribes, in the development of regulations that will so directly impact them.

2. Regulatory amendments. There is a need to review existing regulations to determine where amendment would successfully remove barriers to working with tribes. This effort will be coordinated by the Office of General Counsel and Regional Counsel offices, working with program office staff. Some work in this area has been performed by Regional Counsel staff coordinated by a Regional Counsel member of the Indian Work Group. Completion of the effort will be officially coordinated through OGC, however, with completion of the identification effort and a schedule for amendments completed by fourth quarter 86.

3. Regulation development. While OFA currently attempts to identify developing regulations that need to address Indian issues, the Office of Standards and Regulations needs to ensure that such consideration becomes a standard requirement in agency regulation/policy development. OFA will work with the Office of Standards and Regulations to develop guidance for the program offices to use in the development of agency regulations and policies.

INDIAN PROGRAM IMPLEMENTATION PLAN - TABULAR SUMMARY

ACTIVITY	LEAD OFFICE	FISCAL YEAR			
		85	86	87	88/89
A. Objective: Directly apply EPA's authorities and programs on Indian reservations					
1. Establish an information base					
(a) Conduct national survey	OFA	|———	X		
(b) Mechanism for maintaining information base	OFA		X		
(c) Maintain the information base	REGIONS		|———	———	———
2. Direct program activity by EPA (accelerating level of effort)					
(a) Document on-going activities	OFA	X			
(b) Set media program national objectives (operating guidance and budget)	PROGRAM OFFICES		|———	———	———
(c) Set regional priorities	REGIONS		|———	———	———
3. Strengthen communication between EPA and tribal governments					
(a) Continue liaison with national tribal organizations	OFA	|———	———	———	———
(b) Meetings with tribal leaders and environmental staff	REGIONS		|———	———	———

INDIAN PROGRAM IMPLEMENTATION PLAN - TABULAR SUMMARY (CONTINUED)

ACTIVITY	LEAD OFFICE	FISCAL YEAR 85	86	87	88/89
(c) Technical workshops	REGIONS		|________	________	________
(d) Tribal/EPA agreements (as appropriate)	REGIONS		|________	________	________
4. Develop relationships with other federal agencies					
(a) Indian Health Service	OFA*	|________	________	________	________
(b) Bureau of Indian Affairs	OFA*		|________	________	________
(c) Other federal agencies (as appropriate)	OFA*				
B. Objective: Develop and enhance tribal institutional capability to implement EPA's programs on reservation lands					
1. Strengthen communication between EPA and tribal governments	REGIONS		|________	________	________
2. Technical assistance	REGIONS	|________	________	________	________
3. Training programs	OFA, PROGRAM OFFICES, REGIONS	|________	________	________	________
4. Optional institutional mechanisms	OFA		X		
5. Pilot projects	REGIONS	|________>	Continuation to be determined		

* OFA will develop umbrella agreement; program offices and regions will develop more specific agreements as ap

INDIAN PROGRAM IMPLEMENTATION PLAN - TABULAR SUMMARY (CONTINUED)

ACTIVITY	LEAD OFFICE	FISCAL YEAR 85	86	87	88/89
6. Program grants	PROGRAM OFFICES		To be determined		
7. Construction grants	OFFICE OF WATER		To be determined		
C. Objective: Eliminate the statutory/ regulatory barriers to program implementation					
1. Statutory amendments, with implementing regulations within 18 months of enactment	PROGRAM OFFICES	To be determined			
2. Regulatory amendments Identification of need and development of a schedule	OGC		X		
Amendments	PROGRAM OFFICES		|———	———>	
3. Formally require tribes to be addressed in the development of EPA regulations/policies	OFFICE OF STANDARDS AND REGULATIONS		X		
Agency regulation/policy development	PROGRAM OFFICES		|———	———	———

APPENDIX A

EPA POLICY FOR THE ADMINISTRATION OF ENVIRONMENTAL PROGRAMS ON INDIAN RESERVATIONS

INTRODUCTION

The President published a Federal Indian Policy on January 24, 1983, supporting the primary role of Tribal Governments in matters affecting American Indian reservations. That policy stressed two related themes: (1) that the Federal Government will pursue the principle of Indian "self-government" and (2) that it will work directly with Tribal Governments on a "government-to-government" basis.

The Environmental Protection Agency (EPA) has previously issued general statements of policy which recognize the importance of Tribal Governments in regulatory activities that impact reservation environments. It is the purpose of this statement to consolidate and expand on existing EPA Indian Policy statements in a manner consistent with the overall Federal position in support of Tribal "self-government" and "government-to-government" relations between Federal and Tribal Governments. This statement sets forth the principles that will guide the Agency in dealing with Tribal Governments and in responding to the problems of environmental management on American Indian reservations in order to protect human health and the environment. The Policy is intended to provide guidance for EPA program managers in the conduct of the Agency's congressionally mandated responsibilities. As such, it applies to EPA only and does not articulate policy for other Agencies in the conduct of their respective responsibilities.

It is important to emphasize that the implementation of regulatory programs which will realize these principles on Indian Reservations cannot be accomplished immediately. Effective implementation will take careful and conscientious work by EPA, the Tribes and many others. In many cases, it will require changes in applicable statutory authorities and regulations. It will be necessary to proceed in a carefully phased way, to learn from successes and failures, and to gain experience. Nonetheless, by beginning work on the priority problems that exist now and continuing in the direction established under these principles, over time we can significantly enhance environmental quality on reservation lands.

POLICY

In carrying out our responsibilities on Indian reservations, the fundamental objective of the Environmental Protection Agency is to protect human health and the environment. The keynote of this effort will be to give special consideration to Tribal interests in making Agency policy, and to insure the close involvement of Tribal Governments in making decisions and managing environmental programs affecting reservation lands. To meet this objective, the Agency will pursue the following principles:

1. THE AGENCY STANDS READY TO WORK DIRECTLY WITH INDIAN TRIBAL GOVERNMENTS ON A ONE-TO-ONE BASIS (THE "GOVERNMENT-TO-GOVERNMENT" RELATIONSHIP), RATHER THAN AS SUBDIVISIONS OF OTHER GOVERNMENTS.

EPA recognizes Tribal Governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with Tribal Governments as the independent authority for reservation affairs, and not as political subdivisions of States or other governmental units.

2. THE AGENCY WILL RECOGNIZE TRIBAL GOVERNMENTS AS THE PRIMARY PARTIES FOR SETTING STANDARDS, MAKING ENVIRONMENTAL POLICY DECISIONS AND MANAGING PROGRAMS FOR RESERVATIONS, CONSISTENT WITH AGENCY STANDARDS AND REGULATIONS.

In keeping with the principle of Indian self-government, the Agency will view Tribal Governments as the appropriate non-Federal parties for making decisions and carrying out program responsibilities affecting Indian reservations, their environments, and the health and welfare of the reservation populace. Just as EPA's deliberations and activities have traditionally involved the interests and/or participation of State Governments, EPA will look directly to Tribal Governments to play this lead role for matters affecting reservation environments.

3. THE AGENCY WILL TAKE AFFIRMATIVE STEPS TO ENCOURAGE AND ASSIST TRIBES IN ASSUMING REGULATORY AND PROGRAM MANAGEMENT RESPONSIBILITIES FOR RESERVATION LANDS.

The Agency will assist interested Tribal Governments in developing programs and in preparing to assume regulatory and program management responsibilities for reservation lands. Within the constraints of EPA's authority and resources, this aid will include providing grants and other assistance to Tribes similar to that we provide State Governments. The Agency will encourage Tribes to assume delegable responsibilities, (i.e. responsibilities which the Agency has traditionally delegated to State Governments for non-reservation lands) under terms similar to those governing delegations to States.

Until Tribal Governments are willing and able to assume full responsibility for delegable programs, the Agency will retain responsibility for managing programs for reservations (unless the State has an express grant of jurisdiction from Congress sufficient to support delegation to the State Government). Where EPA retains such responsibility, the Agency will encourage the Tribe to participate in policy-making and to assume appropriate lesser or partial roles in the management of reservation programs.

4. THE AGENCY WILL TAKE APPROPRIATE STEPS TO REMOVE EXISTING LEGAL AND PROCEDURAL IMPEDIMENTS TO WORKING DIRECTLY AND EFFECTIVELY WITH TRIBAL GOVERNMENTS ON RESERVATION PROGRAMS.

A number of serious constraints and uncertainties in the language of our statutes and regulations have limited our ability to work directly and effectively with Tribal Governments on reservation problems. As impediments in our procedures, regulations or statutes are identified which limit our ability to work effectively with Tribes consistent with this Policy, we will seek to remove those impediments.

5. THE AGENCY, IN KEEPING WITH THE FEDERAL TRUST RESPONSIBILITY, WILL ASSURE THAT TRIBAL CONCERNS AND INTERESTS ARE CONSIDERED WHENEVER EPA'S ACTIONS AND/OR DECISIONS MAY AFFECT RESERVATION ENVIRONMENTS.

EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations.

6. THE AGENCY WILL ENCOURAGE COOPERATION BETWEEN TRIBAL, STATE AND LOCAL GOVERNMENTS TO RESOLVE ENVIRONMENTAL PROBLEMS OF MUTUAL CONCERN.

Sound environmental planning and management require the cooperation and mutual consideration of neighboring governments, whether those governments be neighboring States, Tribes, or local units of government. Accordingly, EPA will encourage early communication and cooperation among Tribes, States and local governments. This is not intended to lend Federal support to any one party to the jeopardy of the interests of the other. Rather, it recognizes that in the field of environmental regulation, problems are often shared and the principle of comity between equals and neighbors often serves the best interests of both.

7. THE AGENCY WILL WORK WITH OTHER FEDERAL AGENCIES WHICH HAVE RELATED RESPONSIBILITIES ON INDIAN RESERVATIONS TO ENLIST THEIR INTEREST AND SUPPORT IN COOPERATIVE EFFORTS TO HELP TRIBES ASSUME ENVIRONMENTAL PROGRAM RESPONSIBILITIES FOR RESERVATIONS.

EPA will seek and promote cooperation between Federal agencies to protect human health and the environment on reservations. We will work with other agencies to clearly identify and delineate the roles, responsibilities and relationships of our respective organizations and to assist Tribes in developing and managing environmental programs for reservation lands.

8. THE AGENCY WILL STRIVE TO ASSURE COMPLIANCE WITH ENVIRONMENTAL STATUTES AND REGULATIONS ON INDIAN RESERVATIONS.

In those cases where facilities owned or managed by Tribal Governments are not in compliance with Federal environmental statutes, EPA will work cooperatively with Tribal leadership to develop means to achieve compliance, providing technical support and consultation as necessary to enable Tribal facilities to comply. Because of the distinct status of Indian Tribes and the complex legal issues involved, direct EPA action through the judicial or administrative process will be considered where the Agency determines, in its judgment, that: (1) a significant threat to human health or the environment exists, (2) such action would reasonably be expected to achieve effective results in a timely manner, and (3) the Federal Government cannot utilize other alternatives to correct the problem in a timely fashion.

In those cases where reservation facilities are clearly owned or managed by private parties and there is no substantial Tribal interest or control involved, the Agency will endeavor to act in cooperation with the affected Tribal Government, but will otherwise respond to noncompliance by private parties on Indian reservations as the Agency would to noncompliance by the private sector elsewhere in the country. Where the Tribe has a substantial proprietary interest in, or control over, the privately owned or managed facility, EPA will respond as described in the first paragraph above.

9. THE AGENCY WILL INCORPORATE THESE INDIAN POLICY GOALS INTO ITS PLANNING AND MANAGEMENT ACTIVITIES, INCLUDING ITS BUDGET, OPERATING GUIDANCE, LEGISLATIVE INITIATIVES, MANAGEMENT ACCOUNTABILITY SYSTEM AND ONGOING POLICY AND REGULATION DEVELOPMENT PROCESSES.

It is a central purpose of this effort to ensure that the principles of this Policy are effectively institutionalized by incorporating them into the Agency's ongoing and long-term planning and management processes. Agency managers will include specific programmatic actions designed to resolve problems on Indian reservations in the Agency's existing fiscal year and long-term planning and management processes.

William D. Ruckelshaus

DUAL ROLE OF EPA

Question: EPA is in a rather unique position for a Federal Agency. On one hand, it is a regulatory Agency responsible for the enforcement of statutory deadlines and compliance schedules. Yet, on another, very contrasting level, it has been granted with significant authority and resources to assist States and local units of government towards the attainment of these goals. In a sense, you are the wielder of both the carrot as well as the stick.

This role is not an easy one, but its difficulties have been compounded by budgetary constraints which have shrunk the size of your carrot -- but left unaltered the weight of your "stick".

As an example, States will suffer a one-third reduction in Water Quality Management grants in your FY 1987 Budget, yet remain responsible for compliance with the 1988 deadline on water pollution discharges, not to mention new responsibilities on pretreatments, toxics, and permit issuances... All in the face of a four-year phaseout of construction grant funding... As well as the innumberable other responsibilities being returned to State and local government "control".

Are you satisfied that EPA is, in fact, encouraging greater efficiencies -- or are we shirking our commitments?

Answer: The Agency, recognizing its responsibility to facilitate greater efficiencies in the management of national environmental priorities, is proposing to take significant action in 1987 to address this issue.

Specifically, we are planning to submit grant legislation under which States will be given much greater flexibility to manage their various responsibilities, while receiving exactly the same level of funding as they would under the current system of categorical funding.

The legislation, if structured properly, could provide other benefits as well, such as significant increases in administrative efficiency both at the Federal and State levels. This can be seen through the application process where the States would file one application instead of several. States would also have increased control over the way in which national environmental standards are met. Last, States would be held accountable to their citizens and local governments instead of to the Federal government.

Finally, while such a proposal, if enacted, would have a significant effect on the way in which States manage grant funds, it is not intended to override basic requirements now contained in the various statutes governing EPA's programs. As mentioned, States would be accountable to their citizens and local governments instead of to the Federal government. This accountability would ensure that States maintain and implement all delegated programs.

NATIONAL RURAL WATER ASSOCIATION

Question: You have not requested funding for the Rural Water Training and Technical Assistance Program. This Committee has repeatedly been advised of the value of this program in increasing the efficiency and effectiveness of small rural water systems.

Why are you proposing the termination of this popular and effective program when reductions in Federal cost-sharing efforts are also being proposed for reductions?

Answer: The Agency's position regarding this program is that the National Rural Water Association has demonstrated the effectiveness of grass roots training and technical assistance programs to benefit small systems. As such, we believe that the individual State associations should be able to achieve self-sufficiency through the use of organizational dues and training fees.

RCRA - REGULATING MINING WASTES

Question: If EPA determines to regulate mining waste as a hazardous waste, explain and justify the Agency's legal authority to modify each Subtitle C standard under RCRA [§3004 (x)] for mining wastes.

Answer: Under Section 3004 (x) of RCRA, enacted as part of the Hazardous and Solid Waste Amendments of 1984, if EPA decides to regulate mining waste under RCRA, EPA may modify certain Subtitle C requirements "so long as such modified requirements assure protection of human health and the environment." EPA may modify the Subtitle C requirements based on the special characteristics of such wastes, the practical difficulties associated with implementing such regulations and site-specific characteristics including, but not limited to, the climate, geology, hydrogeology and soil chemistry at the site. Specifically, the EPA Administrator may use this flexibility to modify the requirements of subsections (c), (d), (e), (f), (g), (o), and (u) of Section 3004 and subsection 3005(j), which relate to:

- liquids in landfills,
- prohibitions on land disposal,
- minimum technological requirements,
- continuing releases at permitted facilities, and
- interim status surface impoundments.

It is unclear to what extent EPA has the authority to modify the remaining RCRA Subtitle C requirements for mining wastes, since these requirements are not listed in Section 3004(x). The Office of General Counsel is researching this issue.

Question: In the Adamstown litigation, the court ordered EPA to comply with the schedule EPA submitted to the court. Is my understanding of the court order correct that EPA's schedule addressed only the deadline for submitting the study, and not for making a determination whether to regulate mining waste under RCRA, Subtitle C?

Answer: On August 21 1985, the U.S. District Court for the District of Columbia ordered EPA to meet the schedules it had submitted to the court. EPA's first schedule called for submission of the Report to Congress on mining wastes by December 31, 1985 and a regulatory determination by June 30, 1986. The second schedule called for a proposal to reinterpret the mining waste exclusion by September 30, 1985, and final action on that proposal by September 30, 1986.

Question: Give specific estimates of annual compliance costs to the U.S. mining industry if EPA determines to regulate mining wastes under RCRA. Please explain the source and extent of the data base used for determining this finding.

Answer: Compliance cost to the U.S. metal mining industry for potential hazardous waste management under RCRA are dealt with extensively in Section J of EPA's recent _Report to Congress: Wastes from the Extraction and Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining and Oil Shale_. Cost estimates were developed for EPA by Charles River Associates, a firm with extensive background in mine engineering and economics.

Based on engineering/economic case studies of over 30 metal mining sites and covering several alternative regulatory scenarios, the nationwide _annualized cost_ estimated for RCRA compliance for the copper, gold, silver, lead, and zinc sectors range from $7 million up to over $850 million. This range of costs corresponds with the most likely range of regulatory strategies which the Agency might pursue, ranging from minimal standards limited to some wastes, up to a comprehensive set of Subtitle C - like standards. In this analysis lifetime costs were annualized over a 15-year future mine production period using a real discount rate of 9.0 percent.

Questions Submitted by Chairman Hatfield

NEWPORT, OREGON RESEARCH FACILITY

Question: In an agreement reached with the House during consideration of the FY 1985 Supplemental Appropriations bill, $500,000 was appropriated for design, engineering and planning of a new research facility in Newport, Oregon to replace the currently leased space. Those funds were held pending a feasibility report confirming that building a new facility would be more cost effective than continuing the lease agreement. That report was completed in December 1985 and indicatd new construction was more feasible, however, the funds for engineering and design have not yet been released. Why?

Answer: After release of the feasibility report, the agency's top management was briefed and given an opportunity to review the report. The Administrator has now completed his review and we expect the solicitation for architectural design to be published in the Commerce Business Daily in early April.

Question: The facility contemplated by the Congress was to include new office and lab space (20,000 sq. ft. $5.0 m); a new library (15,000 sq. ft. $1.5 m); test tank facility (concrete housed $300,000); and including architect, engineering and design ($500,000) was to cost $7.3 million. Recently there has been indication that the cost of the facility has escalated to more than $10.0 million, due primarily to the assumption that construction would range between $165 - $195 per square foot. What is the basis for such high construction costs? A survey of other similar facilities in the Pacific Northwest indicates construction costs are between $110 - $130 per square foot. Harborview Hospital in Seattle is adding a 177,000 square foot clinical research lab that comes to about $200 per square foot, BUT THAT INCLUDES THE PRICE OF THE LAND. Please justify your assumptions.

Answer: The escalation of the construction estimate from $7.3M to $10.5M is due primarily to the need for ancillary structures that emerged during the preparation of the Program of Requirements. The current cost breakdown is as follows:

Office-Laboratory (20,000 Net SF)		
30,000 Gross SF @ $188/SF*.		$ 5,634,500
Library (15,000 Net SF)		
21,000 Gross SF @ $125/SF.		$ 2,624,000
Ancillary Structures		
° Pollution Abatement Facility	$500,000	
° Hazardous Materials Storage	$125,000	
° Tow Tank (upgraded).	$750,000	
° Holding Tank (100,000 gal.)	$100,000	
° Pumping System (50,000 gal./hr.)	$ 75,000	
° Extend Marine Line and Utilities	$150,000	
° Site Work.	$100,000	$ 1,800,000
Design and Construction Inspection		$ 500,000
Total..		$ 10,558,500

* The unit cost of $188/SF is based upon the following:

° High water table requires above ground structure, add $5/SF.
° Land is fill of unknown depth requiring spread footings/piles, add $5/SF.
° All equipment and materials must be resistant to marine atmosphere, add $10/SF.
° Laboratory furniture and installed support equipment, add $30/SF.

Thus the premium for building on filled land surrounded by marine water is about $20/SF. Without these factors and laboratory furniture/equipment, construction cost would be about $138/SF which is consistent with your survey figures. As the Program of Requirements is further developed, some of the above items may be reduced or eliminated, resulting in a substantially lower cost estimate.

Question: Assuming engineering and design monies are obligated within the next two weeks, what is the proposed schedule for completion of working drawings, initiation and completion of construction?

Answer: Within the limits of the stated assumption, a reasonable schedule would be:

Advertise design in CBD	4/86
Evaluate, select A/E firm	5/86
Contract A/E firm	6/86
Commence design	7/86
Complete design	7/87

The Agency cannot provide a schedule for completion of construction at this time. Construction funds are not included in our FY 1987 Request. We strongly recommend that Congress does not add funds to the Agency's FY 1987 Budget for this purpose.

QUESTIONS SUBMITTED BY SENATOR LEAHY

CLEAN WATER -- NONPOINT SOURCES

Question: According to the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and 305(b) reports, our national lakes are losing the battle for clean water. In light of this and with particular reference to non-point sources, how does the Environmental Protection Agency (EPA) intend to address this problem?

Answer: EPA does not necessarily agree with the statement that our Lakes are losing the battle for clean water.

For example, the 1985 ASIWPCA Nonpoint Source Report shows that for over 70% of the lake acres assessed, no use impairment from nonpoint sources was found. Less than 6% of lake acres were found to be seriously impaired.

We encourage the other Federal, State, and local governments to increase their level of effort in dealing with this problem. It is the Agency's position that lake eutrophication is an intrastate water quality problem and lake restoration and protection is most appropriately handled by the States in conjunction with other water quality priorities.

CONSTRUCTION GRANTS

Question: How many States will have obligated all their sewage treatment grant funds by May 1, June 1, and August 1?

Answer: By May 1, 1986, a total of 14 States will have obligated their sewage treatment grant funds down to the point that the remaining balance will not be enough to fund the next project on the priority list. By June 1, this figure is 22 States; by July 1, 31 States; and by August 1, 34 States.

DETAILED FTES

Question: How many FTE; in whole or in part, whose salaries are paid from appropriations supplied by this subcommittee are detailed, assigned, loaned or otherwise working for an organization other than the Environmental Protection Agency?

Answer: The Agency currently has 102 employees detailed, assigned, loaned or otherwise working for organizations other than EPA. This includes 83 on Intergovernmental Personnel Act assignments, mostly with State and local governments, 4 on detail to International Health Organizations and 15 to other federal agencies.

WATER BORNE RADON

Question: Is EPA doing any field work related to water borne radon?

Answer: The EPA's Office of Health Research is conducting an epidemiological study to determine the relationship between radon in drinking water and lung cancer. This study is being conducted in Maine and New Hampshire and is scheduled to be completed in 1990. Radon will be measured in the drinking water and the air in homes of individuals with lung cancer and the control population. The results of this study will be used to determine the relative contribution of radon in drinking water to risks of lung cancer from exposure to environmental levels of radon. In addition, the engineering research program is conducting a field study in New Hampshire which involves two small communities for the removal of radon from drinking water.

RADON -- VERMONT TESTING

Question: Will EPA be doing any field testing in Vermont related to radon?

Answer: EPA is in the process of designing a national assessment program to determine the extent of public exposure to indoor radon. This assessment is scheduled to begin early next year. At this time, we have not identified the individual states which will be included in the assessment. The majority of the states will be involved. The selection criteria will include geological and demographic factors.

We are presently providing technical assistance to states, upon their request, as they plan radon measurement and mitigation efforts. Earlier this year, representatives from Vermont participated in an EPA Region I workshop on the methods of radon measurement and mitigation. At that time, they expressed interest in pursuing the matter further with EPA. EPA has not, however, had a request from the state to do any field testing.

STUDIES ON HEALTH EFFECTS OF AIR POLLUTION

Question: In the Senate report on the 1986 budget (p.39), the Agency was directed to perform two studies related to the health effects of air pollution. The conference committee noted that the conferees did not include these funds because they had been assured by the Agency that these studies were already being performed by the Agency. Who within the Agency is performing these studies?

Answer: These studies are being conducted by the Office of Health Research within EPA's Office of Research and Development.

Question: Describe their status and when they are expected to be completed. If they are completed, please provide a summary of their findings.

Answer: As described in the Senate report, these studies are "... an epidemiological study which can detect significant changes in mortality or morbidity caused by current ambient standards pollutants" and "... models for extrapolating health effects other than cancer...".

In 1984, ORD decided to devote the reinstated air epidemiology budget to the study of criteria pollutants, particularly particles and NO_2 pollutants for which we have a reasonable chance of obtaining significant results. There are several epidemiology studies underway on the effects of criteria pollutants, primarily respiratory and immunological effects. These studies are being sponsored by the Office of Health Research (OHR). Preliminary results are expected from many of these studies during FY 1987. They will be completed between FY 1987 and FY 1989.

OHR is also performing extrapolation research, primarily to determine quantitatively the pulmonary risk to humans from inhaling particles and oxidant gases. Final results of this program will depend upon several factors, including specific clinical studies, experimental and theoretical studies of the fate of these pollutants as they pass through the respiratory system, and development and refinement of the sophisticated biomathematical models which use these data. Interim results are becoming available now. Completion of the first model may be as early as FY 1990.

Because of the complexities associated with studying health risks from hazardous air pollutants, we have concentrated efforts in this area on developing a system of tiered bioassays and animal toxicology tests which enable us to predict, based on plant, in vitro and in vivo animal experiments, whether a given compound may pose genotoxic risks to humans. We have also begun developing methods for testing neurotoxic and developmental effects.

HAZARDOUS AIR POLLUTANTS -- REGULATORY DEVELOPMENT

Question: On page 11 of the conference report, the Committee directed that a portion of the additional funds be used for regulatory development of all hazardous air pollutants that the Administrator stated his intent to list in 1986. Has the regulatory development begun on each of these? When is the regulatory work scheduled to be completed?

Answer: During 1986, we expect to publish Notices of Intent to List for seven hazardous air pollutants. We have included in our program plans funding to begin National Emission Standards for Hazardous Air Pollutants (NESHAPs) for sources of all seven pollutants. Standards development is underway. Resources to continue standards development are included in our 1987 budget request. The typical amount of time for developing a NESHAPs is approximately four years. The seven NESHAPs should be promulgated by 1990 or early 1991.

HAZARDOUS AIR POLLUTANTS -- PRE-REGULATORY EVALUATION

Question: On page 11 of the conference report, the Committee also directed the Agency to use a portion of the additional $4.5 million and 75 FTE "for the pre-regulatory evaluations needed to meet the Agency's program objectives for listing of hazardous air pollutants in future years." Please indicate how many additional pre-regulatory evaluations are being performed as a result of these additional funds. Please also provide a list of additional chemicals that will be evaluated as a result of these additional funds.

Answer: A portion of the resources are being used for air toxics activities including the initiation of National Emission Standards for Hazardous Air Pollutants (NESHAPs) for those chemicals where Notices of Intent to List have been issued. In view of Agency priorities and sound workyear management practices in 1986 related to our 1987 request, none of the 1986 resources are being used for pre-regulatory evaluations for the potential listing of hazardous air pollutants.

Current pollutant assessment funding in 1986, together with the Agency's funding request for 1987, will permit the continuation of a strong listing decision program. The Agency plans to make 8-12 listing decisions in 1987. We anticipate that several of these decisions will result in Notices of Intent to List. It is premature at this stage of our analysis to predict the exact number or names of these chemicals. A list of candidate chemicals for the 8-12 decisions anticipated in 1987 is attached.

FY 1987 Listing Decisions

8 - 12

Candidates include:

- Dioxin
- Formaldehyde
- Copper
- Dibenzofurans
- Phosgene
- Acetaldehyde
- Acrolein
- Styrene
- Ammonia
- Napthalene
- Hydrogen Sulfide
- Chlorine
- Toluene Disocyanate
- Zinc
- Zinc Oxide
- Mineral Fibers
- Propylene
- Propylene Oxide

NPDES PERMITS

Question: The Committee, on page 11, added $3 million for additional NPDES activities. How many permits above those requested in the 1987 budget are being reissued as a result of these additional funds?

Answer: The Agency did not distribute those additional workyears to the water program and therefore the outputs did not change.

The Agency's position regarding the Congressional workyear add-ons addresses a primary concern:

The Agency's 1987 budget is 200 workyears less than the 1986 Congressionally enacted level. In an effort to align the Agency's overall workyear levels in 1986 with the levels in the 1987 President's Budget, the Administrator decided not to distribute workyears to programs which will receive a net workyear decrease in the 1987 budget.

Question: The same portion of the report directed the Agency to describe the priority setting process it uses to determine which permits are being reissued. Why has this process not been communicated to the Senate Committee. Please submit the description of this process.

Answer: Attached are copies of the Agency's Policy for the Second Round Issuance of National Pollutant Discharge Elimination System (NPDES) Permits for Industrial Sources and the National NPDES Minor Permit Issuance Strategy.

The second round permit policy establishes priorities for issuing major permits, and the Agency has followed it since June 2, 1982, when it was issued. Currently, since the backlog of major permits has been substantially reduced, we are striving to issue all expired major permits on time so that no new backlogs develop. This eliminates the need to set priorities within the category of major permittees.

We are just beginning to focus on reissuance of the backlogged, expired minor permits. In past years minor permits were issued at the discretion of the Regions and States depending on their major permit workload. Under the attached strategy, States and regions will be identifying their significant minor permits for priority attention as part of the Agency's formal program tracking system in FY 87.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
WATER

Policy for the Second Round Issuance of National Pollutant Discharge Elimination System (NPDES) Permits for Industrial Sources

STATEMENT OF POLICY

EPA-issued industrial NPDES permits will be issued according to the following priorities. (A detailed explanation of the policy is contained in the attachment to the "Implementation" section of this policy.) First priority shall be given to facilities discharging to waters where use impairment problems have been identified and where there is adequate information to develop either a water quality-based permit or, in the exceptional case detailed in the attachment, a BAT/BCT permit relying on best professional judgment. The second priority is to permit facilities for which applicable BAT effluent limitations guidelines have been promulgated. The third priority covers facilities suspected of contributing to the impairment of a designated water use but where insufficient information exists to confirm the extent of the use impairment. The fourth priority addresses facilities for which effluent limitations guidelines are not scheduled for promulgation and the existing permit limitations do not reflect sufficient treatment. The lowest priority is extension or reissuance of permits to facilities for which effluent limitations guidelines are not scheduled and the existing permit requires sufficient treatment. In all permitting actions, EPA will work cooperatively with States and permittees and adhere to procedures established by applicable statutes and regulations. This policy also establishes a mechanism for developing priority permit lists with the first list due by June 30, 1982 (see "Other Considerations" in the Attachment).

EXPIRATION DATE

This policy will remain in effect until September 30, 1983.

BACKGROUND

EPA and authorized States issue NPDES permits for periods not to exceed five years. Permit limits are based either on the application of available technology or on the protection of water quality, whichever is more stringent. The Clean Water Act (CWA) establishes two levels of technology standards and deadlines for industrial compliance: best practicable control technology currently available (BPT) by July 1, 1977 and best available technology economically achievable/best conventional technology (BAT/BCT) by July 1, 1984.

The majority of the "first round" permits, reflecting BPT or more stringent water quality-based limitations, were issued between 1974 and 1976. Most of these were based on technology using "best professional judgment" (BPJ) because effluent guidelines were unavailable (relying on section 402(a)(1) of the CWA). In

1978, as these permits began to expire, EPA instituted a policy of reissuing short-term (2 to 3 year) permits in order to await promulgation of BAT/BCT effluent guidelines. Most of these short-term permits have now expired. Thus there are now more than 35,000 expired permits. For the most part, these expired permits continue in effect under the federal Administrative Procedure Act or similar State statutes.

In the past, EPA and many States focused almost exclusively on the technology-based effluent limitations approach. While EPA will continue this technology-based approach using BAT/BCT effluent limitations guidelines, EPA will also look beyond technology-based requirements and issue permits based on scientifically determined requirements for assuring environmental protection. The development of requirements based on protection of water quality has often been hampered by lack of data. This policy makes clear that the burden of data collection is shared by EPA, the State, and the discharger. Further, the implementation of this policy should assure the most effective use of resources by carefully scheduling permit activities, waiting for national treatment standards where practicable, making better use of existing data, and initiating cooperative efforts with States and permittees.

This approach is supported by initiatives that will strengthen both technology-based and water quality-based effluent limitations. It will produce permits of lasting value that are not subject to frequent change. EPA is moving ahead to promulgate national effluent limitations guidelines on a schedule which will provide guidelines for 24 primary industry categories before the end of FY 1983. Promulgated effluent limitations guidelines, in conjunction with their development documents, expert assistance, and permit writer training, will assure the application of good science and produce well founded permit limitations. Individual permit limitations developed in this way will significantly reduce conflicts and avoid protracted appeals.

A sound technical and legal basis for permit limits is also provided by State water quality standards. All States have standards for each designated water use which include both numeric criteria for specific pollutants and general conditions. Expanding the scope of these standards and improving their scientific basis is a continuing process which is now being given additional attention by EPA, the States, and throughout the scientific community. EPA is encouraging States to review and revise their standards to reflect site-specific factors. The technological basis for implementing these standards using Total Maximum Daily Load/Wasteload Allocations is being significantly advanced. These factors and site-specific biological and chemical analysis will provide the needed scientific basis for water quality-based effluent limitations in permits.

APPLICATION

This policy applies only to EPA-issued industrial NPDES permits although States may choose to adopt the principles outlined.

IMPLEMENTATION

This policy is implemented by establishing permit issuance priorities and developing priority permit lists and schedules. This approach is designed to assure the best use of available resources and produce results where they are most needed. The details of this approach are explained in the attachment.

6/2/82
Date

Frederic A. Eidsness, Jr.
Assistant Administrator
for Water

Second Round Industrial Permitting Policy
(EPA-Issued Permits Only)

Attachment

Permitting Priorities	Discussion/Implementation
First Priority Issue permits to facilities where water use impairment problems have been identified	o States, with EPA assistance, identify water bodies where it is known that the water use is impaired or other major water quality problems exist. This may be based on factors such as drinking water supply contamination, exceedences of applicable water quality standards, and bioaccumulation of toxic pollutants. In coordination with the State, the available scientific information should be reviewed to identify significant contributors and determine whether there is adequate scientific information to develop water quality-based limits for those dischargers. o For those dischargers identified as contributing to a use impairment or other major water quality problem, and for which there are sufficient information and data, permit limits should be developed based on section 303(d) total maximum daily load/wasteload allocations (TMDL/WLA's) and relevant portions of section 208 plans. Where sufficient data exist, EPA may develop water quality-based limits in the absence of 303(d) TMDL/WLA's, using scientifically acceptable methods, including the use of bioassays. However, such effluent limits are subject to public, administrative, and judicial review as part of the permit process and any other permittees contributing to the water quality problem will have an opportunity to participate after notice of proposed effluent limits. All water quality-based permits with expiration dates beyond July 1, 1984, also must meet the statutory definition of BAT and BCT. o In those exceptional cases where major water quality problems are identified but there is insufficient information to develop limitations based on water quality, and effluent guidelines will not be available in the near term, the permit should be based on good scientific information with the limits reflecting BAT/BCT. In making determinations of BAT/BCT, the permit writer will rely on best professional judgment. Such permits will be issued with five year terms. More stringent limits required by national technology-based guidelines issued during the term of the permit will be included in subsequent permits. In addition, the organic chemicals and plastics/synthetics industry categories will likely present a number of cases which, because of the identified use impairment or other major water quality problems, justify the use of this approach. EPA headquarters will provide assistance to permit writers through teams of industry experts for these industrial categories.
Second Priority Issue permits based on promulgated BAT guidelines where BAT guidelines are scheduled	o Where BAT effluent guidelines have been promulgated, permits will be issued reflecting guidelines and any other necessary BAT/BCT or water-quality based limits. If BAT guidelines are scheduled but have not been promulgated and no major water quality problems are involved, the first round BPT permit should be extended under the Administrative Procedure Act (APA) while waiting for BAT guidelines.

June 2, 1982

Second Round Industrial Permitting Policy
(EPA-Issued Permits Only)

Permitting Priorities	Discussion/Implementation
Third Priority Issue permits to facilities where water use impairment problems are suspected	o For those dischargers suspected of contributing to major water use impairment or other major water quality problems, but where insufficient confirming data exist, a specific short-term program of data collection should be initiated. The data collection program should include requirements for biomonitoring, chemical analysis, or field surveys necessary to obtain information to determine the magnitude and extent of the water use impairment. In setting up the data collection program, particular attention should be paid to potential contamination of public drinking water supplies. EPA Headquarters will provide further guidance on both the procedural mechanisms for implementing this data collection program as well as substantive guidance on the type of biomonitoring or chemical analysis requirements that could be used to collect data. o If sufficient information is obtained that shows the discharger is contributing to water use impairment problems, a new five year permit or modification of existing permit limits should be developed as appropriate.
Fourth Priority Issue permits where upgrading is needed and BAT guidelines are not scheduled	o Where no further BAT guidelines development is planned and the first round permit does not reflect sufficient treatment to comply with BAT/BCT, subsequently promulgated BPT guidelines or water quality standards, upgrade the permits limits and/or other necessary conditions and issue a five-year permit. Limits on conventional pollutants reflecting BCT may be developed using the BCT methodology when it becomes available, and limits on priority pollutants reflecting BAT should be developed using BPJ. Normally, significant discharges of priority pollutants are not expected where BAT guidelines are not scheduled for development.
Fifth Priority Issue permits for all others as the last priority	o Where no further guidelines development is planned but the first round permit requires sufficient treatment (i.e., would meet what are likely to be considered BAT/BCT limits and no water quality problems are suspected), the existing permit may be extended under APA provisions or reissued only as the last priority.

June 2, 1982

Second Round Permitting Policy
(EPA-Issued Permits Only)

Attachment

Page 3

Other Considerations

1. Priority Permits	EPA Regional Offices will identify facilities which are probable contributors to water use impairment or other major water quality problems. The 305(b) reports and 303(d) priority segments will be considered in identifying these priority facilities. Using this and other information, the Regional Offices will develop a listing of permits which are expected to be issued before October 1, 1983 consistent with the priorities established by this policy. The listing will include permit issuance schedules which will provide a reasonable estimate of expected issuance. The initial list of priority permits and schedules are to be transmitted to Headquarters by June 30, 1982. This list should be updated periodically to reflect current plans and priorities. Encouraging States to establish similar priority lists is also essential to the national program.
2. General Permits	In addition to the points described above, we are encouraging the use of general permits to cover many facilities with the same or substantially similar types of operations and the same types of wastestream discharges. This should help significantly in reducing the backlog of expired NPDES permits. The Office of Water will analyze the opportunities for general permits for industry categories, including some primary industry categories, where the facilities' operations and discharges are very similar. Multi-State coverage will also be considered. We will keep you informed of progress in this area. In the meantime, permitting authorities should consider issuing general permits in their own jurisdictions where appropriate.
3. Compliance Deadline	All permits extending past July 1, 1984 must contain final limitations that are deemed equivalent to BAT/BCT regardless of whether the limits are based on water quality, effluent guidelines, or BPJ.

June 2, 1982

NATIONAL
NPDES MINOR PERMIT ISSUANCE STRATEGY

USEPA
Office of Water

Office of Water Enforcement and Permits

Permits Division

Technical Support Branch

January, 1986

I. Purpose of the Minor Permit Issuance Strategy

Background

The Clean Water Act provides that no pollutants may be discharged from point sources to the waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit. This includes all point sources, whether previously permitted under the NPDES permits program or not. The Act does not differentiate between major and minor point sources and, therefore, requires the Environmental Protection Agency and the NPDES States to issue and maintain current NPDES permits for all sources.

EPA developed a major/minor classification system for industrial and municipal NPDES permits to provide an initial framework for setting permit issuance priorities during the first and second rounds of NPDES permit issuance. Historically, major permits have been considered more significant sources and, therefore, have been accorded more regulatory attention than minor permits. Major permits almost always have the capability to impact receiving waters if not controlled. Minor permits may, or may not, adversely impact receiving waters if not controlled.

There are approximately 65,000 dischargers in the United States which have been issued NPDES permits. Currently, 7 500 of these, due to size or composition of wastewater or both, are termed "major" permits. The remainder are termed "minor" permits. According to the national Permit Compliance System (PCS) data base, the national minor permit backlog is about 23,500 (see Appendix A).

EPA's Office of Water announced its strategy for issuance of major permits on June 2, 1982. This strategy directed EPA Regions to focus permitting resources on the issuance of major permits. As a result, the backlog of expired major permits has been largely eliminated. However, this approach has also contributed to a large and continuing backlog of expired minor permits in both NPDES States and EPA Regions. The minor permit issuance strategy is aimed at reducing the minor permit backlog while EPA and States eliminate backlogs of major permits or reduce them to an absolute minimum.

Purpose of Strategy

This strategy has three purposes:

1. To promote issuance and reissuance of minor NPDES permits by establishing manageable expiration schedules and thereby maintaining a manageable permitting workload.
2. To establish national priorities for minor permit issuance based first on environmental significance and second on regulatory efficiency.
3. To identify and plan for development and distribution of permit issuance tools to all regulatory agencies to enhance existing capabilities for issuing minor permits.

Framework for Strategy Development and Implementation

Two EPA tracking and accountability systems, the Strategic Planning and Management System (SPMS) and the Office of Water Accountability System (OWAS), address minor permit issuance.

The Administrator's agency-wide tracking system, SPMS, includes a requirement that Regions and NPDES States submit numerical commitments for the issuance of "significant" minor permits for FY 1986. The minor permit issuance strategies developed by the EPA Regions and NPDES States as required by OWAS should reflect these numerical commitments.

The tracking system for the Assistant Administrator for Water, OWAS, for FY 1986 includes requirements for two commitments and two corresponding tracking elements for them. First, like SPMS, it includes a numerical commitment requirement for issuance of "significant" minor permits. This commitment is identical to the SPMS numerical commitment except that OWAS requires the total commitment to be broken down into municipal and non-municipal components. Second, OWAS includes a requirement for the development of State-by-State minor permit issuance strategies, by July 1986, to provide for a thoughtful planning and prioritizing process for the issuance of minor permits.

For FY 1986, OWAS does not specifically require that States or Regions list the names of minor permittees they plan to address in FY 1986. However, the implementation of State strategies must culminate in identifying specific individual minor permits, which will be used for tracking performance against SPMS targets in FY 1987. Prior to the beginning of FY 1987, lists of specific permits must, therefore, be developed based on the priorities of the State minor permit issuance strategies. These lists should be maintained through PCS, but may be revised periodically by the permitting authority.

Both accountability systems require the issuance of NPDES permits to "significant" minors. The identification of significant minors will depend on the issuance strategy for each State, but significant minor dischargers should be distinguished by their clearly definable environmental impact when compared to other minor dischargers. Each State strategy should identify significant minor permits as those permits to be issued that fiscal year based on the priority ranking factors listed in each strategy. Those permits of highest priority in that fiscal year for which an issuance commitment has been made will be significant minors.

The OWAS guidance document provides the following summary definition of a State minor permit issuance strategy:

"A strategy for minor permit issuance is to be prepared for each State by the permitting authority based on the national minor permit issuance strategy currently scheduled for release on October 31, 1985. The strategy should consist of two specific elements. First, it should list individual priority ranking factors (such as the presence of toxics, water quality considerations, and geographical distributions) which will be used to divide each State's universe of minor permits into priority groups. The strategies should distinguish industrial and municipal permits since there may be some differences in priority associated with these dischargers. Second, the strategy should contain details of implementation including methods used for issuance such as general permtis, model permits, etc. and the resources assigned to this activity. These strategies are to be used in preparing a list of significant minor permits which will be required as a part of the FY 87 commitment process."

In addition, each strategy should embody the following principles:

- Each minor permit issuance strategy should have as its ultimate goal the elimination of the backlog of all expired NPDES permits by the end of FY 1990.
- Each permit issuance strategy should result in a permit issuance process that eliminates or reduces surges in permit expirations and concomitant fluctuations in permit issuance workload. Since most NPDES permits expire every five years, the regulatory authority should try to achieve a permit issuance process that results in the reissuance each year of about 20% of the total universe of permits issued.
- Whenever possible, permit issuance priorities should be established to avoid or minimize the need for reopener provisions and reissued permits should contain final, enforceable effluent limits. To the extent practicable, permit issuance should be planned to coincide with the expected availability of all necessary information, including wasteload allocations, variance decisions, etc.
- States and Regions should have programs in place for identifying and addressing unpermitted sources. Non-filer discharges identified under these programs should be issued permits according to a specified priority. Stormwater discharges are candidates for such programs.
- Each strategy should emphasize the use of all available tools for the efficient issuance of minor permits, especially the use of general permits. Where an NPDES State has not been authorized to issue general permits, the strategy should include a discussion of the steps needed for the State to obtain such authority. Although States are not required to adopt a general permit program, they are encouraged to do so where minor permit backlogs are otherwise unmanageable.

Example Strategies

A "Basin-wide" issuance strategy is useful when water quality is of concern, since water quality problems are often caused by the combined effects of a number of dischargers. The basin-wide approach focuses attention on all discharges on a given waterbody. Each basin in a State is catalogued, the dischargers are identified, and all permits in the basin are issued. The State establishes priorities for each basin and schedules permit issuance according to those priorities assuring that all permits in the State are addressed in a five year period. 1/

An "Administrative" or "Workload Management" issuance strategy is another approach. The principle of this approach is to identify dischargers according to priority over the five year permit cycle, and to issue 20 percent of them each fiscal year.

II. Establishing Priorities For Minor Permit Issuance

Limited resources and the sheer number of minor permits require that EPA Regions and NPDES States set sensible priorities to facilitate the issuance or reissuance of minor permits.

The following priority ranking factors are separated into industrial and municipal categories because priorities are somewhat different for these two types of dischargers. Further, existing policies for municipal permit issuance (including the National Municipal Policy) have already established priorities for certain municipal dischargers.

States and Regions have the flexibility to structure a strategy based on other priority ranking factors as well. However, each minor permits strategy should reflect the following factors.

Priorities for Minor Industrial Permits Issuance

1. Water Quality Impact

Discharges known or suspected to impact water quality should be considered the highest priority for permit issuance. The following elements should be used to determine whether the permittee is included in this category:

i) the permittee discharges to a known water quality limited waterbody (or waterbodies if a basin-wide approach is used) where the designated use is not being achieved because of point source discharge;

ii) the permittee discharges pollutants at levels which exceed existing water quality standards or EPA criteria;

iii) the permittee discharges to a waterbody into which numerous other point sources also discharge and the combination of these loads exceeds the standards and/or exceeds 1% of the total flow;

1/ This approach involves major permits as well as minor permits. "Basin-wide" issuance strategies must be consistent with the June 2, 1982 strategy for issuance of major permits, and must ensure that backlogs of expired major permits are eliminated or kept to an absolute minimum. Short-term permits may be one approach to synchronizing the issuance of permits for a number of dischargers within a basin, while simultaneously preventing backlogs of expired major permits.

iv) the permittee is included in a wasteload allocation designed to achieve water quality standards; and/or

v) the permittee's effluent has been tested and found to be acutely or chronically toxic; and/or

vi) the permittee's effluent has been analyzed and found to contain significant levels of toxic pollutants not now regulated in the current permit.

Discharges of toxic pollutants which impact water quality should generally be accorded higher priority than discharges of conventional pollutants. Unpermitted sources and stormwater dischargers are generally expected to be the lowest priority within the water quality impact priority ranking factor.

2. "Special Priority" Waterbodies

Due to a high level of public interest or through designation as a high priority waterbody by Congress, EPA or a State, certain waterbodies have been elevated to a special priority. An example would be the Chesapeake Bay, considered by surrounding States and the EPA to be a high priority waterbody requiring increased regulatory attention. Dischargers to such water bodies, whether known to affect water quality or not, should normally be accorded priority in an issuance strategy. Since such waterbodies usually cross State boundaries, local basin planning organizations or commissions, as well as public interest groups, should be included in the priority setting process.

3. Industrial Category

Certain industrial categories can be considered high priority candidates for permit issuance because of two characteristics: the typical composition of their wastewaters and their potential coverage by efficient permitting mechanisms such as effluent guidelines or general permits. The guiding principle in this priority factor is the need to combine maximum efficiency with type and amount (and thus impact) of pollutants controlled. The level of assigned priority will be based on consideration of both of these concerns.

Emphasis on toxics control in the upcoming rounds of NPDES permit issuance suggests that the primary industrial categories, with their high potential for toxics discharge, are higher priority than the secondary industrial categories. Industries are often concentrated in different regions of the country. Therefore different categories are of higher or lower significance depending on the State or Region. No attempt is made to list the most important industrial categories. Regions and States must make these specific determinations.

Permits that can be issued using efficient permitting mechanisms generally should receive higher priority than those which require regulatory resources out of proportion to their environmental significance. Permit issuance mechanisms which are more efficient include permits based on effluent guidelines, model permits, general permits, and computer-assisted permits. Certain industrial categories have more uniform discharge characteristics than others and are usually candidates for efficient permit issuance mechanisms.

The secondary industries have considerably less potential for toxics discharges and frequently discharge only conventional pollutants. Accordingly, these types of permits receive the lowest priority within this priority ranking factor.

4. All Other Permits

Permits which do not fit the above categories generally should be considered lowest priority for permit issuance.

Priorities for Minor Municipal Permits Issuance

The issuance and modification of minor municipal permits must reflect the established priority system in the National Municipal Policy (NMP) published in the Federal Register on January 30, 1984 (49 FR 3832). To the extent possible, permit actions necessary to support the NMP activities should be given high priority.

1. Permits Actions to Support National Municipal Policy Implementation. 2/

Where permits must be issued or modified to provide enforceable compliance schedules under section 301(i)(1) or to establish applicable effluent limits, they should be given high priority. Because major capital investments may be necessary to meet final permit limits, the municipality should be given final permit limits as quickly as possible to promote compliance at the earliest possible date. In descending order of priority, examples of permit actions in this category include (a) modifications to include compliance schedules for construction based on an approved Municipal Compliance Plan (MCP) document; (b) permit issuance following a §301(h) marine waiver decision; (c) secondary redefinition (40 CFR 133.105) permits where POTWs are eligible for such limitations; (d) other permit actions to implement composite correction plans (CCPs), such as conditions which require improved O & M procedures or BMPs which are necessary to achieve compliance.

2. Water Quality Impact

Permits impacting water quality should be considered high priority candidates for permit issuance. The discussion of water quality considerations presented on page 5 above (priority ranking factor for industrial permits) should be used to determine whether a municipal permit is included in this category.

3. "Special Priority" Waterbodies

Municipalities which discharge to these receiving waters should be treated in the same manner described on page 5 above for industrial sources.

4. Pretreatment

POTWs which are required to develop and implement local pretreatment programs are of special importance due to the potential for toxics discharge.

2/ These POTWs should already be identified in State Strategies or Section 106 Workplans as discussed in the March 1984 guidance document for the National Municipal Policy.

5. Minor Permit Issuance to Expedite Grant Funding Decisions

If permit limit decisions are causing delays in grant funding decisions (such as AT review comments which indicate permit changes are appropriate or a pending secondary redefinition decision) the permit should receive priority attention.

6. All Other Minor POTWs

Municipal permits which do not fit the above categories should be considered lower priority candiates for permit issuance. Privately-owned minors are included in this category.

Table 1 summarizes these priority ranking factors for both industrial and municipal permits.

III. Timing

As required by OWAS, strategies must be completed for each State by July 1, 1986. These strategies should be based on the principles and priorities presented in this document. Further, these strategies should form the basis for the identification of specific minor permits to be issued in accordance with SPMS and OWAS commitments for FY 1987. These lists of specific minor permits should be developed prior to the end of FY 1986.

Strategies developed under this guidance should be reflected in the priorities established under the Section 106 workplans negotiated for FY 1987 by the States and EPA Regions.

Each State-by-State minor issuance strategy should be implemented immediately upon completion.

IV. Minor Permit Issuance Tools

One of the purposes of this strategy is to identify and provide or develop tools for the regulatory agencies to use to facilitate minor permit issuance. Numerous documents exist which will immediately assist permitting authorities to issue minor permits. Existing tools are listed in Appendix B. Some of the more useful tools are the General Permit Program Guidance and Abstracts of Industrial NPDES Permits. Other tools are being developed or planned for development for development in FY 86. A package containing copies of the existing tools and a schedule for the development of future tools will be distributed to permitting authorities in February 1986.

V. Summary

The national permit compliance system (PCS) indicates that approximately 23,000 minor permits, or about 40% of the total number of minor permits are currently expired and have not been reissued. Minor permit issuance strategies are therefore needed on a State-by-State basis to reduce this backlog of expired minor permits and to ensure that the most environmentally significant permits are issued in a timely manner. EPA's SPMS tracking and accountability system requires numerical commitments for the issuance of significant minor permits. Individual State minor permit issuance strategies are required by EPA's OWAS accountability system in FY 86.

Table 1. Summary of Priority Ranking Factors.

INDUSTRIAL	MUNICIPAL
1. Water Quality Impact - known or suspected impact due to toxics discharge or effluent toxicity - impact due to conventional pollutants	1. Permit Actions to support the National Municipal Policy. - permit issuance/modification to establish final effluent limits. - permit issuance/modification to establish enforceable permit schedules. - Section 301(h) permits following final decisions. - secondary redefintion o trickling filters or lagoons o percent removal adjustment
2. Special Priority Waterbody - discharge is to a designated high priority waterbody	2. Water Quality Impact - known or suspected impact due to toxics discharge or effluent toxicity. - impact due to conventional pollutants.
3. Industrial Category - primary industries - discharge toxic pollutants - amenable to general or model permits - secondary industries - discharge conventional pollutants only	3. Special Priority Waterbody - discharge is to a designated high priority waterbody
4. All Other Minor Permits - low number of sources - no process wastewaters - very lar	4. Pretreatment - includes approximately 250 minor POTWs (some may be eligible for higher priority because of criteria above)
	5. Minor Permit Issuance to Expedite Grant Funding Decisions.
	6. All Other Minor Permits - privately-owned minor facilities included.

REGIONAL BACKLOG SUMMARY

Permit Type	Number of Permits	Number Expired	Percent Expired
Municipal Majors	933	102	11%
Primary Majors	936	89	10%
Secondary Majors	260	50	19%
Federal Majors	34	6	18%
Other Majors	2	0	0%
TOTAL MAJORS	2165	247	11%
Municipal Minors	2369	1058	45%
Primary Minors	1417	581	41%
Secondary Minors	4406	2534	58%
Federal Minors	375	271	72%
Other Minors	133	4	3%
TOTAL MINORS	8700	4448	51%

Source: PCS, January 10, 1986

This system requires commitments from NPDES permit issuance authorities on total significant minors to be issued in FY86 together with development of State-by-State strategies by July 1, 1986. These State strategies are to be used in preparing lists of significant minor permits to be issued in FY 87.

This minor permit issuance strategy is intended to help EPA regional and State permit programs significantly reduce or eliminate backlogs of expired minor permits by FY 1990, while eliminating or achieving an absolute minimum backlog of expired major permits, maintaining relatively constant expiration and reissuance levels, and corresponding uniform workloads and resource demands.

STATE BACKLOG SUMMARY

Permit Type	Number of Permits	Number Expired	Percent Expired
Municipal Majors	2741	325	12%
Primary Majors	2187	317	14%
Secondary Majors	282	39	14%
Federal Majors	100	23	23%
Other Majors	7	0	0%
TOTAL MAJORS	5317	704	13%
Municipal Minors	9687	3336	34%
Primary Minors	11865	4942	42%
Secondary Minors	24213	8771	36%
Federal Minors	874	376	43%
Other Minors	1973	1483	75%
TOTAL MINORS	48612	18908	39%

Source: PCS, January 10, 1986

STATE BACKLOG MAJORS

Region	State	Municipal Majors	Expired	Percent	Non-Municipal Majors	Expired	Percent
1	CT	77	29	38%	126	44	35%
	VT	29	3	10%	8	3	38%
	RI	19	3	16%	15	3	20%
2	NY	263	17	6%	171	24	14%
	NJ	159	66	42%	168	60	36%
	VI	2	0	0%	5	1	20%
3	PA	229	12	5%	179	28	16%
	WV	34	3	9%	76	11	14%
	MD	35	11	31%	57	8	14%
	VA	61	6	10%	76	22	29%
	DE	14	2	14%	22	1	5%
4	NC	122	9	7%	97	20	21%
	TN	85	2	2%	82	4	5%
	AL	83	7	8%	120	8	7%
	KY	56	7	13%	192	16	8%
	MS	43	1	2%	39	0	0%
	SC	83	5	6%	104	7	7%
	GA	101	1	1%	61	0	0%
5	WI	89	12	13%	62	6	10%
	MI	92	4	4%	121	24	20%
	OH	149	12	8%	141	33	23%
	IL	170	14	8%	111	8	7%
	IN	99	6	6%	92	8	9%
	MN	49	3	6%	28	1	4%
7	NE	42	0	0%	27	[illegible]	7%
	KS	32	16	50%	17	1	6%
	MO	83	16	19%	53	3	6%
	IA	62	10	16%	33	0	0%
8	MT	26	1	4%	20	3	15%
	ND	16	1	6%	9	0	0%
	WY	17	0	0%	22	2	9%
	CO	74	12	16%	51	3	6%
9	CA	147	10	7%	95	7	7%
	HI	11	1	9%	19	0	0%
	NV	8	2	25%	3	1	33%
10	WA	44	14	32%	49	10	20%
	OR	36	7	19%	25	7	28%
		2741	325	12%	2576	379	15%

Source: PCS, January 10, 1986

REGIONAL BACKLOG (MAJORS & MINORS)

Region	Municipal Majors	Expired	Percent	Non-Municipal Majors	Expired	Percent
I	205	16	8%	154	28	18%
II	34	1	3%	79	24	30%
III	1	1	100%	4	0	0%
IV	116	3	3%	164	5	3%
VI	440	62	14%	481	59	12%
VIII	64	4	6%	26	2	8%
IX	26	5	19%	30	5	17%
X	47	10	21%	294	22	7%

Region	Municipal Minors	Expired	Percent	Non-Municipal Minors	Expired	Percent
I	148	101	68%	723	650	90%
II	78	20	26%	126	31	25%
III	0	0	0%	9	2	22%
IV	69	3	4%	600	50	8%
VI	1689	855	51%	3649	2293	63%
VIII	256	5	2%	227	21	9%
IX	35	9	26%	90	22	24%
X	94	65	69%	907	321	35%

Source: PCS, January 10, 1986

Expired Primary Minors*

INDUSTRIAL CATEGORY	REGION										TOTAL
	1	2	3	4	5	6	7	8	9	10	
1211 Bituminous Coal			1718	465	1108	54					3345
4911 Electric Services	44				100	26	22			70	262
3079 Miscellaneous Plastics Prod.	68	25	17			96					206
1041 Gold Ores								18		120	138
2421 Sawmills & Planing Mills						21			17	61	99
3471 Plating & Polishing	37	10			16						63
3069 Fabric. Rubber Products	27				26						53
3321 Gray Iron Foundries	13				40						53
2911 Petroleum Refining						40					40
2436 Soft Veneer and Plywood										39	39
2411 Logging Camps										36	36
2869 Indust. Organic Chemicals						29					29
3714 Motor Vehicle Parts & Access.					27						27
1213 Bituminous & Lignite Mine Sr.			27								27
2813 Industrial Gases						24					24
3679 Electronic Components	23										23
2819 Industrial Inorganic Chem						23					23
2621 Paper Mills Exc Building Papr	22										22
3469 Metal Stampings, NEC					20						20
7215 Coin-Operated Laundries			19								19
3411 Metal Cans					11						11

*Expired primary minor permits with 10 or more expired in an industrial category within a state or a total of 20 or more expired in an industrial category.

Expired Primary Minors*

INDUSTRIAL CATEGORY	REGION 1	2	3	4	5	6	7	8	9	10	TOTAL
1211 Bituminous Coal			1718	465	1108	54					3345
4911 Electric Services	44				100	26	22			70	262
3079 Miscellaneous Plastics Prod.	68	25	17			96					206
1041 Gold Ores								18		120	138
2421 Sawmills & Planing Mills						21			17	61	99
3471 Plating & Polishing	37	10			16						63
3069 Fabric. Rubber Products	27				26						53
3321 Gray Iron Foundries	13				40						53
2911 Petroleum Refining						40					40
2436 Soft Veneer and Plywood										39	39
2411 Logging Camps										36	36
2869 Indust. Organic Chemicals						29					29
3714 Motor Vehicle Parts & Access.					27						27
1213 Bituminous & Lignite Mine Sr.			27								27
2813 Industrial Gases						24					24
3679 Electronic Components	23										23
2819 Industrial Inorganic Chem						23					23
2621 Paper Mills Exc Building Papr	22										22
3469 Metal Stampings, NEC					20						20
7215 Coin-Operated Laundries			19								19
3411 Metal Cans					11						11

*Expired primary minor permits with 10 or more expired in an industrial category within a state or a total of 20 or more expired in an industrial category.

STATE BACKLOG MINORS

Region	State	Municipal Minors	Expired	Percent	Non-Municipal Minors	Expired	Percent
1	CT	14	4	29%	522	351	67%
	VT	66	14	21%	51	17	33%
	RI	2	1	50%	84	51	61%
2	NY	267	73	27%	3215	2383	74%
	NJ	99	45	45%	834	342	41%
	VI	8	1	13%	19	5	26%
3	PA	613	262	43%	2392	987	41%
	WV	217	140	65%	2800	1331	48%
	MD	154	82	53%	953	443	46%
	VA	222	37	17%	1472	306	21%
	DE	3	0	0%	61	5	8%
4	NC	250	28	11%	2487	294	12%
	TN	159	0	0%	1362	73	5%
	AL	174	8	5%	1163	41	4%
	KY	211	9	4%	2358	604	26%
	MS	309	2	1%	1053	147	14%
	SC	235	84	36%	931	230	25%
	GA	403	8	2%	581	0	0%
5	WI	475	445	94%	1286	1247	97%
	MI	477	300	63%	854	552	65%
	OH	660	403	61%	2700	1743	65%
	IL	694	270	39%	1644	701	43%
	IN	363	234	64%	1443	582	40%
	MN	549	178	32%	747	499	67%
7	NE	300	45	15%	679	255	38%
	KS	386	146	38%	621	296	48%
	MO	696	230	33%	2160	914	42%
	IA	639	37	6%	690	51	7%
8	MT	77	0	0%	268	36	13%
	ND	255	0	0%	107	6	6%
	WY	68	1	1%	800	3	0%
	CO	187	29	16%	574	42	7%
9	CA	100	26	26%	855	288	34%
	HI	8	5	63%	54	11	20%
	NV	4	3	75%	29	8	28%
10	WA	179	109	61%	615	411	67%
	OR	164	77	47%	461	317	69%
		9687	3336	34%	38925	15572	40%

Source: PCS, January 10, 1986

Expired Minor Primary Permits*

Region I

	Total	NH	ME	RI	MA	VT	CT
Electric Services	44	11	22	0	7	1	3
Electronic Components, NEC	23	2	0	1	7	1	12
Fabric. Rubber Products	27	1	1	1	11	1	12
Miscellaneous Plastics Prod.	68	6	4	10	29	1	18
Paper Mills Exc Building	22	2	4	0	15	1	0
Plating and Polishing	37	0	0	0	7	0	30

Region II

		PR	VI	NY	NJ
Miscellaneous Plastics Prod.	25	1	0	7	17
Plating and Polishing	10	0	0	10	0

Region III

		DC	MD	DE	VA	PA	WV
Bituminous & Lignite Mine Serv.	27	0	0	0	23	2	2
Bituminous Coal & Lignite	1718	0	142	0	20	169	1387
Coin-Operated Laundries	19	0	0	1	10	1	7
Gray Iron Foundries	13	0	0	0	3	10	0
Miscellaneous Plastics Prod.	17	0	2	3	1	10	1

Region IV

		FL	TN	NC	SC	MS	KY	GA	AL
Bituminous Coal and Lignite	465	0	10	0	0	0	448	0	7

Region V

		IN	IL	WI	OH	MI	MN
Bituminous Coal and Lignite	1108	47	50	3	1006	0	2
Electric Services	100	12	13	30	13	24	8
Fabric. Rubber Products	26	2	0	5	11	6	2
Gray Iron Foundries	40	3	1	23	3	9	1
Metal Cans	11	1	0	10	0	0	0
Metal Stampings, Nec	20	0	1	9	3	6	1
Miscellaneous Plastics RP	96	7	6	34	16	25	8
Motor Vehicle Parts & Access.	27	4	1	2	5	15	0
Plating & Polishing	16	1	0	2	2	10	1

Region VI

	Total	TX	OK	NM	LA	AR
Bituminous Coal & Lignite	54	6	29	5	1	13
Electric Services	26	13	4	2	5	2
Indust. Organic Chemicals	29	16	1	0	8	4
Industrial Gases	24	13	1	0	10	0
Industrial Inorganic Chem.	23	11	1	0	9	2
Petroleum Refining	40	28	0	0	11	1
Sawmills & Planing Mills	21	4	2	0	8	7

Region VII

		KS	NE	MO	IA
Electric Services	22	15	1	6	0

Region VIII

		UT	SD	ND	CO	WY	MT
Gold Ores	18	0	4	0	2	0	12

Region IX

		AZ	NV	CA	HI
Sawmills & Planing Mills	17	0	0	17	0

Region X

		ID	AK	WA	OR
Electric Services	70	21	7	17	25
Gold Ores	120	23	92	1	4
Logging Camps	36	0	34	1	1
Sawmills & Planing Mills	61	7	7	17	30
Softwood Veneer and Plywood	39	0	0	7	32

*Expired primary minor permits with 10 or more expired in an industrial category within a state or a total of 20 or more expired in an industrial category.

Expired Secondary Minors*

INDUSTRIAL CATEGORY	REGION 1	2	3	4	5	6	7	8	9	10	TOTAL
1311 Crude Petro & Natural Gas			147			2231		20	31	24	2453
4941 Water Supply	70	55	150	55	568	193	204			44	1339
0211 Beef Cattle Feedlots						257	885			74	1216
8211 Elementary & Sec. Schools	39	97	334	133	145	55	79			34	916
6515 Mobile Home Site Operators		22	219	89	124	157	123				734
5171 Petroleum Bulk Stations	60	156	90	45	21				14	44	430
1321 Natural Gas Liquids						388					388
9711 National Security	24	25	26	66		85	45			40	311
7011 Hotels, Motels & Tourist Co		34	51	27	38	34	81				265
4922 Natural Gas Transmission			22			232					254
7999 Amusement & Recreation		30	40	24		104	32		18		248
6514 Dwelling Oper. Except Apt.	19		27	117			26				189
6512 Nonresidential Building	23	26	49	36	27		17				178
2092 Fresh or Frozen [illegible] Fish	13		40			39				82	174
1442 Construction Sa [illegible]		28			32	38	25			34	157
6513 Apartment Building Operat		63	25	36			31				155
7033 Trailering Parks for Transient			25	22	24		80				151
1422 Crushed & Broken Limestone					47		98				145
0921 Fish Hatcheries & Preserves	22									120	142
5541 Gasoline Service Stations			42	20	34		40				136
5812 Eating Places		14	34	31			54				133
2011 Meat Packing Plants		36		46	37		13				132
9512 Land, Mineral, Wildlife C					50	59	16				125
6552 Subdividers and Developer			19	49			55				123
4011 Railroads, Line-Haul Oper		12	29		42	19					102
2022 Cheese Natural & Processed					100						100
7032 Sporting & Recreational Camp		22	58			17					97
2033 Canned Fruits & Vegetables		23			72						95
1381 Drilling Oil & Gas Well						85					85
9621 Regulation, Admin. of Transp	21				32					29	82
2091 Canned & Cured Seafoods	25		13			16				26	80
9999 Nonclassifiable Establish		77									77
8811 Private Households			23	47							70
1389 Oil & Gas Field Service						68					68
2026 Fluid Milk		21			43						64
7542 Car Washes			39			24					63
0241 Dairy Farms						61					61
1382 Oil & Gas Exploration Serv.						11			14	33	58
5154 Livestock						49					49
0723 Crop Prep Services for Market										49	49
7997 Membership Sports & Rec.			22		23						45
2023 Condensed & Evaporated Milk					44						44
0213 Hogs						44					44
1521 Single-Family Housing Con						43					43
3273 Ready-Mixed Concrete						25		17			42
4226 Special Warehousing & Storage						41					41
7299 Miscellaneous Personal Serv.						35					35
4971 Irrigation Systems						32					32

INDUSTRIAL CATEGORY	REGION 1	2	3	4	5	6	7	8	9	10	TOTAL
0212 Beef Cattle Except Feedlot						32					32
3999 Manufacturing Industries					31						31
8361 Residential Care		17	13								30
4784 Fixed Facil's for Vehicle		28									28
4463 Marine Cargo Handling						27					27
8051 Skilled Nursing Care Facilities							24				24
2021 Creamery Butter					24						24
8062 General Med. & Surgic. Hosp					23						23
1629 Heavy Construction NEC					22						22
9511 Air, Water & Solid Waste					21						21
3255 Fire Clay							20				20
2061 Raw Cane Sugar						20					20
4613 Refined Petroleum Pipe Lines			19								19
8661 Religious Organizations							18				18
0259 Poultry & Eggs NEC		18									18
4939 Combination Utility Svc.					17						17
9223 Correctional Institutions						17					17
0252 Chicken Eggs						16					16
2037 Frozen Fruits & Vegetables										15	15
3229 Pressed & Blown Glass		13									13
2013 Sausages and Other Prepared Meat				13							13
6531 Real Estate Agents & Manager			11								11

*Expired secondary minor permits with 10 or more expired in an industrial category within a state or a total of 20 or more expired in an industrial category.

Expired Minor Secondary Permits*

Region I

	Total	NH	ME	RI	MA	VT	CT
Canned & Cured Seafoods	25	0	25	0	0	0	0
Dwelling Operators, Except Apt.	19	0	0	1	1	0	17
Elementary & Secondary Schools	39	2	12	6	15	0	4
Fish Hatcheries and Preserves	22	7	6	1	8	0	0
Fresh or Frozen Packaged Fish	13	0	10	1	2	0	0
National Security	24	3	4	6	4	0	7
Nonresidential Building	23	5	4	0	7	0	7
Petroleum Bulk Stations & Term.	60	2	21	9	17	0	11
Regulation, Admin. of Trans.	21	0	17	0	3	0	1
Water Supply	70	1	11	5	26	1	26

Region II

		PR	VI	NY	NJ
Amusement and Recreation	30	0	0	30	0
Apartment Building Operation	63	1	2	50	10
Canned Fruits and Vegetables	23	1	0	21	1
Construction Sand & Gravel	28	2	0	25	1
Eating Places	14	0	0	2	12
Elementary & Secondary Schools	97	15	0	42	40
Fixed Facil's for Vehicle	28	0	0	26	2
Fluid Milk	21	0	0	19	2
Hotels, Motels & Tourist Co.	34	2	2	24	6
Meat Packing Plants	36	0	0	36	0
Mobile Home Site Operators	22	0	0	18	4
National Security	25	4	0	10	11
Nonclassifiable Establish	77	0	0	77	0
Nonresidential Building Operators	26	3	0	10	13
Petroleum Bulk Stations & Term.	156	0	0	125	31
Poultry and Eggs NEC	18	0	0	18	0
Pressed and Blown Glass	13	0	0	13	0
Railroads, Line-Haul Operators	12	0	0	11	1
Residential Care	17	1	0	15	1
Sporting and Recreational	22	1	0	18	3
Water Supply	55	1	0	36	18

Region III

		DC	MD	DE	VA	PA	WV
Amusement and Recreation	40	0	7	2	2	19	10
Apartment Building Operators	25	0	4	1	3	8	9
Canned and Cured Seafoods	13	0	2	1	10	0	0
Car Washes	39	0	5	0	10	4	20
Crude Petroleum & Natural	147	0	1	0	1	144	1
Dwelling Operators, Except Apt.	27	0	4	0	1	21	1
Eating Places	34	0	7	0	5	9	13
Elementary & Secondary Schools	334	0	38	5	80	114	97

Region III (cont'd)

		DC	MD	DE	VA	PA	WV
Fresh or Frozen Packaged Fish	40	0	16	1	23	0	0
Gasoline Service Stations	42	0	3	0	6	12	21
Hotels, Motels, & Tourist Co.	51	0	10	0	13	15	13
Membership Sports & Rec.	22	0	11	2	1	5	3
Mobile Home Site Operators	219	0	14	17	9	98	81
National Security	26	1	10	1	8	2	4
Natural Gas Transmission	22	0	3	0	1	8	10
Nonresidential Building Operators	49	0	3	0	1	7	38
Petroleum Bulk Stations & Term.	90	0	3	6	11	43	27
Private Households	23	0	4	4	13	1	1
Railroads, Line-Haul Operators	29	0	2	1	1	9	16
Real Estate Agents and Managers	11	0	0	0	0	1	10
Refined Petroleum Pipe Lines	19	0	2	1	12	4	0
Residential Care	13	0	1	0	1	10	1
Sporting & Recreational Camp	58	0	6	0	2	13	37
Subdividers and Developers	19	0	0	0	0	12	7
Trailering Parks for Transients	25	0	3	1	1	13	7
Water Supply	150	0	26	5	20	56	43

Region IV

		FL	TN	NC	SC	MS	KY	GA	AL
Amusement & Recreation	24	0	1	6	1	5	7	0	4
Apartment Building Operation	36	1	0	5	5	5	19	0	1
Dwelling Operators, Except Apt.	117	1	0	69	35	0	12	0	0
Eating Places	31	0	0	10	2	1	18	0	0
Elementary & Secondary Schools	133	3	6	33	10	9	67	0	5
Gasoline Service Stations	20	1	0	3	1	2	13	0	0
Hotels, Motels, & Tourist Co.	27	1	0	7	3	3	11	0	2
Meat Packing Plants	46	0	0	2	0	43	1	0	0
Mobile Home Site Operators	89	10	0	27	12	12	28	0	0
National Security	66	6	28	10	5	9	8	0	0
Nonresidential Building Operators	36	1	0	8	4	3	20	0	0
Petroleum Bulk Stations & Term.	45	5	0	7	22	0	8	0	3
Private Households	47	0	0	39	0	0	8	0	0
Sausages & Other Prepared Meat	13	0	0	1	2	10	0	0	0
Subdividers and Developers	49	0	0	18	1	3	27	0	0
Trailering Parks for Transients	22	0	0	1	2	6	13	0	0
Water Supply	55	1	0	12	12	1	27	0	2

Region V

		IN	IL	WI	OH	MI	MN
Air, Water & Solid Waste	21	1	14	1	3	0	2
Canned Fruits and Vegetables	72	7	6	35	5	9	10
Cheese ~~Natural and Proces~~	100	0	3	83	3	1	10
Combination Utility Svc.	17	0	13	0	1	2	1
Condensed and Evaporated Milk	44	2	2	31	2	2	5
Construction Sand and Gravel	32	4	4	2	13	4	5
Creamery Butter	24	1	0	7	0	3	13

Region V (cont'd)

		IN	IL	WI	OH	MI	MN
Crushed & Broken Limestone	47	7	8	7	18	6	1
Elementary & Secondary Schools	145	53	49	17	14	3	9
Fluid Milk	43	3	2	11	3	5	19
Gasoline Service Stations	34	6	9	6	12	0	1
General Med. & Surgic. Hosp	23	1	3	12	4	2	1
Heavy Construction NEC	22	1	8	0	3	0	10
Hotels, Motels, & Tourist Co.	38	10	9	7	9	2	1
Land, Mineral, Wildlife Conserv.	40	12	9	8	3	0	8
Manufacturing Industries	31	4	1	22	3	0	1
Meat Packing Plants	37	5	4	8	11	3	6
Membership Sports & Rec.	23	4	9	7	1	2	0
Mobile Home Site Operators	124	26	40	12	25	16	5
Nonresidential Building Operators	27	2	12	3	1	2	7
Petroleum Bulk Stations & Term.	21	1	5	5	3	7	0
Railroads, Line-Haul Opararators	42	5	12	11	7	3	4
Regulation, Admin. of Trans.	32	12	10	5	2	0	3
Trailering Parks for Transients	24	7	10	3	2	1	1
Water Supply	568	87	121	65	157	11	127

Region VI

		TX	OK	NM	LA	AR
Amusement & Recreation	104	10	73	1	3	17
Beef Cattle Except Feedlot	32	27	0	3	1	1
Beef Cattle Feedlots	257	162	66	27	1	1
Canned & Cured Seafoods	16	1	0	0	15	0
Car Washes	24	6	6	1	5	6
Chicken Eggs	16	11	0	0	0	5
Construction Sand & Gravel	38	23	2	3	6	4
Correctional Institutions	17	12	0	0	3	5
Crude Petroleum & Natural Gas	2231	726	18	2	1480	5
Dairy Farms	61	21	1	37	1	1
Drilling Oil & Gas Well	85	26	0	0	59	0
Elementary & Secondary Schools	55	31	2	3	11	8
Fresh or Frozen Packaged	39	22	0	0	17	0
Hogs	44	32	5	4	0	3
Hotels, Motels, & Tourist Co.	34	20	3	1	5	5
Irrigation Systems	32	19	1	12	0	0
Land, Mineral, Wildlife Conserv.	69	27	5	13	8	16
Livestock	49	23	2	3	1	20
Marine Cargo Handling	27	18	0	0	8	1
Miscellaneous Personal Serv.	35	12	0	0	22	1
Mobile Home Site Operators	157	107	6	7	26	11
National Security	85	39	4	1	12	29
Natural Gas Liquids	388	196	14	0	175	3
Natural Gas Transmission	232	88	10	2	96	36
Oil & Gas Exploration Serv.	11	0	0	0	11	0
Oil & Gas Field Service	68	21	2	0	43	2
Railroads, Line-Haul Operators	19	2	1	2	13	1
Raw Cane Sugar	20	1	0	0	19	0

Region VI (cont'd)

		TX	OK	NM	LA	AR
Ready-Mixed Concrete	25	19	1	0	2	0
Single-Family Housing Const.	43	27	0	0	14	2
Special Warehousing & Storage	41	17	6	0	17	1
Sporting and Recreational Camp	17	11	1	1	0	4
Water Supply	193	68	48	6	50	21

Region VII

		KS	NE	MO	IA
Amusement & Recreation	32	2	1	29	0
Apartment Building Operators	31	0	0	31	0
Beef Cattle Feedlots	885	34	836	8	7
Construction Sand and Gravel	25	0	7	17	1
Crushed and Broken Limestone	98	50	0	41	7
Dwelling Operators, Except Apt.	26	0	0	26	0
Eating Places	54	0	1	53	0
Elementary & Secondary Schools	79	0	0	78	1
Fire Clay	20	0	0	20	0
Gasoline Service Stations	40	2	1	37	0
Hotels, Motels, & Tourist Co.	81	0	1	79	1
Land, Mineral, Wildlife Conserv.	16	0	0	15	1
Meat Packing Plants	13	1	2	10	0
Mobile Home Site Operators	123	5	2	113	3
National Security	45	0	0	44	1
Nonresidential Building Operators	17	0	0	17	0
Ready-Mixed Concrete	17	1	3	13	0
Religious Organizations	18	0	0	18	0
Skilled Nursing Care Facilities	24	1	0	22	1
Subdividers and Developer	55	1	0	54	0
Trailering Parks for Transients	80	0	1	78	1
Water Supply	204	108	3	44	49

Region VIII

		UT	SD	ND	CO	WY	MT
Crude & Petroleum & Natural Gas	20	0	2	0	2	15	1

Region IX

		AZ	NV	CA	HI
Amusement & Recreation	18	1	0	17	0
Crude Petroleum & Natural Gas	31	0	0	31	0
Oil & Gas Exploration Serv.	14	0	0	14	0
Petroleum Bulk Stations & Term	14	0	0	13	1

Region X (cont'd)

		ID	AK	WA	OR
Beef Cattle Feedlots	74	58	0	14	2
Canned & Cured Seafoods	26	0	7	12	7
Construction Sand & Gravel	34	9	6	14	5
Crop Prep Services for Market	49	0	0	47	2
Crude Petroleum & Natural	24	0	24	0	0
Elementary & Secondary Schools	34	3	15	4	12
Fish Hatcheries and Preserves	120	15	18	77	10
Fresh or Frozen Packaged Fish	82	0	28	40	14
Frozen Fruits and Vegetables	15	2	0	11	2
National Security	40	0	26	11	3
Oil & Gas Exploration Serv.	33	0	33	0	0
Petroleum Bulk Stations & Term.	44	0	36	4	4
Regulation, Admin. of Trans.	29	0	26	3	0
Water Supply	44	15	6	14	9

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APPENDIX B

Tools for Minor Permit Issuance

Management/Administration

1. Model NPDES Permit Format.
2. NPDES Permit Issuance Schedule, Michigan Surface Water Quality Division, Permits Section.
3. Industrial File Review, EPA Region I.
4. Minor Municipal Permits - Selection Criteria and Management Information.
5. Procedures used to track General Permit Coverage - EPA Region I.
6. Priority Water Problem List - New York State Department of Environmental Conservation.
7. General Conditions, State Pollutant Discharge Elimination System (SPDES) Discharge Permit - New York State Department of Environmental Conservation.
8. MDSD Tools Available for Issuance of Minor Permits.

Industrial Permits

1. Abstracts of Industrial NPDES Permits - July 1985 Edition
2. Authorization to Discharge under the NPDES - Permit Format, Michigan Water Resources Commission

Municipal Permits

1. Authorization to Discharge under the NPDES - sample permit conditions for Secondary Treatment, Water Quality-Based Limits, Stable Effluent and Lagoons - Michigan Water Resources Commission.
2. Personal Computer Program to Develop Secondary Redefinition Permit Limits.

General Permits

1. Draft General Permit Program Guidance, October 4, 1985.
2. Notice of Draft General NPDES Permit for certain dischargers of domestic waste into La Parguera Bay, Lajas, Puerto Rico, - EPA Region II.
3. General Permit for Coal Mining Activities in the Commonwealth of Kentucky - EPA Region IV.
4. General Permit for Non-Contact Cooling Water - EPA Region I.

NSPS REVIEWS

Question: The Committee added $1.5 million for NSPS reviews. I understand that these reviews have not been initiated. Please describe why this direction was not followed and supply a copy of the document directing that this activity not take place which states the reason that this activity was not undertaken.

Answer: In view of the Agency's 1987 request level, sound workyear management has made it necessary for EPA to shift the additional resources provided by Congress in 1986 for NSPSs. In addition, we had to further reduce NSPS resources to fund competing higher priority air toxics efforts.

We believe that funding the air toxics activities will bring more immediate health benefits. The final six NSPS source categories on the Agency's priority list are all emitters of volatile organic compounds (VOCs) and will contribute to reducing ozone levels. However, in the areas with the worst ozone problems, States must adopt emission standards requiring the lowest achievable emission rate (LAER), requirements more stringent than NSPSs. These State standards should already be in place.

There is no document directing or explaining the reason for the reduction in NSPS resources.

RCRA

Question: In a colloquy on the Senate floor (December 17, 1985). Chairman Garn and Ranking Member Leahy asked the Agency to take certain actions with regard to the RCRA. A response was received on February 21. It did not respond directly to a number of the directions included in the colloquy.

First, the Committee requested an estimate of the costs needed to reach a 90% compliance. That estimate was not included. The Committee is aware that until the hearing the Agency was not publicly willing to commit to a 90% goal. It is also aware that the Agency does not believe that 90% physical compliance is possible. The Committee notes that it has never used the term "physical compliance."

Using a definition of compliance which the Agency believes is useful and sound, please supply the Agency's estimated cost of achieving 90% compliance by 1989. The estimate should include the amounts in the 1987 request designed to achieve this objective and an estimate of the costs for 1988 and 1989.

Answer: The Agency's 1987 RCRA budget request as submitted is fully supportive of the objective of achieving 90 percent compliance by 1989. Specifically, an estimated $43.0 million of the 1987 request is associated with achieving compliance defined as detecting, responding to, and tracking the status of violations by the regulated community.

The Agency noted in the February 21 response that many factors outside of the control of EPA and State enforcement programs will determine the actual compliance level achieved. The response noted that returning a facility back into compliance in a timely manner can be difficult, particularly in the case of ground water monitoring violations.

The 1987 request supports the Agency's RCRA enforcement program priority to take timely and appropriate action when violations are detected. This priority is also one of the major objectives of the compliance strategy. To support this effort, the 1987 budget includes resources for inspecting over ten thousand hazardous waste handlers regulated under RCRA, and resources for the enforcement actions necessary to address the estimated number of major violations that will be detected by these inspections. At this time, EPA anticipates developing resource requests for 1988 and 1989 based on compliance and enforcement activities similar to 1987 estimates.

Question: Second, the Committee directed that the Agency prepare an assessment of the training and skills mix needed to achieve the 90% goal. This was not provided. Please provide it.

Answer: A key element of EPA and State efforts to achieve and maintain a high RCRA compliance rate involves identifying and providing the necessary training and skill mix. A detailed assessment of the training and skill needs for RCRA compliance personnel is included in a recently completed report developed by the Hazardous Waste Ground-Water Task Force. The Task Force was charged to recommend ways to strengthen compliance; identify solutions, training and guidances needed to improve the enforcement program; and provide a complete assessment of training needs for enforcement officials. As outlined in the Task Force report, the Agency's training program needs improvements in some areas. Program managers are currently reviewing the work of the Task Force, and are considering modifications suggested in the report.

Training needs identified in the report were categorized by three major experience levels: New Hire, defined as those with less than one year of relevant experience; Intermediate, with one to five years experience; and Journeyman, with more than five years of experience. New Hire personnel require training to equip them with basic knowledge about the RCRA program, along with initial training in technical areas. Intermediate personnel should receive training in the same areas as New Hires, but the courses should go into more depth and include a field or laboratory component. Journeyman training should include advanced level coursework along with reviews of state-of-the-art technologies. Individual training needs will vary within each grouping as previous background, experience and training, together with individual job requirements and the specific mission of the office are taken into account.

The following broad topic areas of training have been identified as needed at each of the experience levels:

o Technical Training including topics such as basic hydrology, sampling analysis, ground-water investigation and instrumentation, site characterization, and well installation techniques.

- o Enforcement Training including topics such as RCRA Penalty Policy, negotiations, evidence preparation and control, investigative techniques, and chain-of-custody requirements.

- o Legal/Regulatory topics such as RCRA/CERCLA statutes, RCRA administrative orders, State and local laws affecting ground-water, and case management.

- o Management/Policy training including topics such as ground-water data management, health and safety planning, community relations, and document control.

Currently, a variety of training courses and seminars are being made available or are under development for RCRA enforcement personnel. The Agency recognizes the important role proper training and skills for enforcement personnel will have on the ability to achieve compliance rate goals, and EPA will continue to evaluate and modify when necessary its efforts in this area.

Question: Third, the Committee requested that the Agency prepare a mechanism for tracking progress toward achieving that goal. That mechanism has not been provided to the Committee. Please provide it.

Answer: The Agency has in place oversight mechanisms for tracking progress toward achieving high RCRA compliance. The high priority the Agency places on its efforts to improve RCRA compliance is reflected in EPA's Strategic Planning and Managment System (SPMS). SPMS, which tracks progress in the major program activiies of EPA for senior Agency management, includes detailed reporting on RCRA significant non-compliance violations. Enforcement actions taken and the return to compliance are specifically tracked in this reporting system.

RCRA information management, including data collection, reporting and analysis, has received increased attention from program managers. EPA continues to adjust and modify reporting requirements so that program managers will have the information necessary to evaluate program success and upon which appropriate programmatic decisions can be made. The primary information management system for the RCRA program is the Hazardous Waste Data Management System (HWDMS). HWDMS collects compliance data on all hazardous waste facilities, with the data being entered by State and EPA Regional offices.

The Agency has experienced difficulty using HWDMS to generate accurate reports which show RCRA compliance information. Program managers have made upgrading HWDMS a priority, and recent changes to the system have improved the quality and usability of the system. While efforts to improve HWDMS are being taken, the Agency has committed to a new information system for the RCRA program. The RCRA Information System (RCRIS) is currently under design and development to provide complete compliance monitoring and enforcement information from the States and Regions. RCRIS will be an information management system which will provide timely and accessable information to EPA and will greatly assist in the ability to track the progress of our enforcement strategy and enforcement program.

In addition to the RCRA compliance data HWDMS currently collects, and which RCRIS will in the future, the Agency also conducts reviews concerning the quality of the Regional and State implementation of the program. EPA reviews State conducted inspections and enforcement actions through compliance monitoring enforcement logs; through oversight inspections; and through evaluation of enforcement actions taken by the States. Additionally, EPA Headquarters conducts periodic program evaluations of Regional offices, and the Regional offices conduct mid- and end-of-year reviews of State enforcement performance.

Question: Fourth, the Committee asked that the Agency communicate to the States that the Agency has a goal of 90% compliance. In light of Assistant Administrator Porter's response to Senator Leahy that the goal would now be communicated to the Agency, please describe the form in which the goal will be communicated to the States and regions.

Answer: The Office of Solid Waste and Emergency Response will communicate to the Regional Administrators and State Directors the Compliance Strategy provided to Congress. The annual RCRA Implementation Plan (RIP) will continue to provide short term and long term program direction, priorities, and expectations. The Agency plans to finalize and issue the RIP in late April. These actions should ensure that the 90 percent compliance goal is fully disseminated to EPA and State RCRA program managers.

Question: Please indicate why the Agency did not respond to all of of the Committee's requests in the colloquy of October 17.

Answer: The Agency was preparing to submit its response to the Committee's requests when this question was submitted for the record. We apologize for the lateness of this response.

PROPOSED LAND BAN REGULATIONS

Question: What portions of the 1987 budget will be used in support of or to implement the land ban proposed regulations? Please describe the amounts in FTE's and appropriation accounts.

Answer: The January 14, 1986 proposed regulatory framework for land ban decisions is just one component of EPA's land-ban program. The 1987 budget for the RCRA Regulations, Guidelines and Policies program element includes a total of 52 FTE and $13.7 million for land disposal restrictions. These resources are primarily for specific banning decisions/treatment alternatives; chemical data development to support regulatory decisions; and initial implementation activities including the ban petition process.

Resources are not separately identified at this point for land ban activities in the Regional and State grant program elements. Compliance with land ban requirements will be evaluated along with other requirements during permit development and enforcement activities.

The proposed regulatory framework may be revised based on comments received during the comment period. Resources needed for implementation depend on the terms of promulgated land ban decisions, which will occur in phases from November 1986 through July 1990, and on the number of petitions EPA will receive, which is not yet known.

EPA BUDGET IN CONSTANT 1981 DOLLARS

Question: Please provide a table comparing the 1981 EPA budget with the President's 1987 request adjusted for constant dollars. Please display by appropriated account and also by media.

Answer: The following tables provide a comparison of the 1981 EPA budget with the President's 1987 request adjusted for constant dollars. Table I is displayed by media. Table II is displayed by appropriated account.

TABLE 1
FY 1987 REQUEST VS. FY 1981 APPROPRIATED
IN CONSTANT 1981 DOLLARS
(DOLLARS IN THOUSANDS)

MEDIA	FY 1987 PRESIDENT'S BUDGET	FY 1987 PRES. BUD ADJUSTED 1/	FY 1981 ACTUAL APPROPRIATED	DIFFERENCE: FY 1987 ADJUSTED VS. FY 1980 ACTUAL
AIR	$239,228.4	$185,720.5	$244,934.6	($59,214.1)
WATER QUALITY	$217,841.0	$171,639.3	$334,348.5	($162,709.2)
DRINK WATER	$84,126.5	$65,142.2	$82,893.2	($17,751.0)
HAZ WASTE	$256,236.2	$198,573.1	$150,475.2	$48,097.9
PEST	$69,433.1	$55,249.6	$69,199.2	($13,949.6)
RAD	$11,972.0	$9,666.6	$13,403.7	($3,737.1)
NOISE	$0.0	$0.0	$12,958.1	($12,958.1)
INTERDISC	$47,874.9	$38,429.0	$14,388.0	$24,041.0
TOXICS	$89,327.7	$71,059.4	$103,168.8	($32,109.4)
NEW FACILITIES	$0.0	$0.0	$450.0	($450.0)
ENERGY	$59,589.4	$46,262.3	$104,529.6	($58,267.3)
REPAIRS & IMP	$5,000.0	$4,090.0	$3,665.0	$425.0
REG. COUNCIL	$0.0	$0.0	$2,500.0	($2,500.0)
PRG MGMT	$14,858.8	$12,243.6	$12,691.0	($447.4)
AGENCY MGMT	$101,354.2	$83,058.4	$78,523.0	$4,535.4
REGION MGMT	$28,397.0	$23,586.5	$27,092.6	($3,506.1)
SUPPORT	$151,226.8	$116,816.6	$98,368.1	$18,448.5
SUPERFUND	$1,050,000.0	$815,045.2	$74,742.9	$740,302.3
CONST. GRANTS	$1,800,000.0	$1,472,400.0	$1,604,837.0	($132,437.0)
TOTAL	$4,226,466.0	$3,368,982.3	$3,033,168.5	$335,813.8

EXPLANATION OF VARIOUS INDICES APPLIED TO FY 1987 PRESIDENT'S BUDGET

1. FEDERAL CIVILIAN PAY: APPLIED TO ALL S&E AND SUPERFUND PC&B EXPENDITURES.
2. FEDERAL NONDEFENSE NONPAY PURCHASES: APPLIED TO ALL OTHER S&E AND SUPERFUND EXPENDITURES ALONG WITH ALL R&D AND ALL NON-STATE GRANT AC&C FUNDS.
3. FEDERAL CONSTRUCTION, NON-RESIDENTIAL STRUCTURES: APPLIED TO OUR BUILDINGS AND FACILITIES FUNDS AND CONSTRUCTION GRANTS
4. STATE AND LOCAL GOVERNMENT PURCHASES DEFLATOR: APPLIED TO AC&C STATE GRANT FUNDING.

TABLE II
FY 1987 REQUEST VS. FY 1981 APPROPRIATED
IN CONSTANT 1981 DOLLARS
(DOLLARS IN THOUSANDS)

APPROPRIATION	FY 1987 PRESIDENT'S BUDGET	FY 1987 PRES. BUD ADJUSTED 1/	FY 1981 ACTUAL APPROPRIATED	DIFFERENCE: FY 1987 ADJUSTED VS. FY 1980 ACTUAL
S & E	$687,947.0	$559,506.9	$561,693.9	($2,187.0)
A C & C	$490,785.0	$369,149.6	$534,794.0	($165,644.4)
R & D	$192,734.0	$148,790.6	$250,485.7	($101,695.1)
B & F	$5,000.0	$4,090.0	$4,115.0	($25.0)
REG. COUNCIL	$0.0	$0.0	$2,500.0	($2,500.0)
SF	$1,050,000.0	$815,045.2	$74,742.9	$740,302.3
SUBTOTAL	$2,426,466.0	$1,896,582.3	$1,428,331.5	$468,250.8
CONST. GRANTS	$1,800,000.0	$1,472,400.0	$1,604,837.0	($132,437.0)
TOTAL	$4,226,466.0	$3,368,982.3	$3,033,168.5	$335,813.8

EXPLANATION OF VARIOUS INDICES APPLIED TO FY 1987 PRESIDENT'S BUDGET

1. FEDERAL CIVILIAN PAY: APPLIED TO ALL S&E AND SUPERFUND PC&B EXPENDITURES.
2. FEDERAL NONDEFENSE NONPAY PURCHASES: APPLIED TO ALL OTHER S&E AND SUPERFUND EXPENDITURES ALONG WITH ALL R&D AND ALL NON-STATE GRANT AC&C FUNDS.
3. FEDERAL CONSTRUCTION, NON-RESIDENTIAL STRUCTURES: APPLIED TO OUR BUILDINGS AND FACILITIES FUNDS AND CONSTRUCTION GRANTS
4. STATE AND LOCAL GOVERNMENT PURCHASES DEFLATOR: APPLIED TO AC&C STATE GRANT FUNDING.

BUSINESS POLLUTION CONTROL INVESTMENT

Question: According to material prepared by Environmental Safety, there has been a 38% decline in the level of business pollution control investment (see attachment). Why do you think this has occurred?

Answer: National accounting data indicate reductions in business investments in pollution controls relative to levels seen in the 1970's. However, this does not imply that business is spending less to control pollution. This is because 1) investments made in the 1970s represent initial capital expenditures that do not yet require replacement, and 2) many toxics control efforts do not appear in the national accounts as business pollution control investment.

Rising investment in pollution abatement equipment in the 1970's reflected initial outlays to meet requirements of the Clean Water Act and Clean Air Act. The average life of pollution control equipment is on the order of 15 years. Therefore, we do not expect to see large capital outlays for replacing pollution control investments made in the 1970's until the late 1980's and 1990's. Reductions in pollution control investments observed since 1980 reflect this.

Further, many of the pollution control investments made in the 1970s involved the fitting of equipment at existing production facilities As time passes and the regulated community matures, new and cleaner production processes are adopted and new facilities built. These environmentally beneficial investments would not show up in business surveys as pollution control expenditures per se, but as investment in plant and equipment generally.

The decline in real investment in pollution controls also reflects the different nature of toxics regulation. The screening and control of chemical products under TSCA and FIFRA do not require outlays for pollution control equipment. Likewise, expenditures made under CERCLA to clean up Superfund sites would not show up as business investment.

One also expects to see investments decline after 1980 because of general economic conditions. The investment pattern of the early 1980's reflects the recession and the sharp rise in interest rates. Corporate bond rates jumped by more than two points between 1980 and 1981 (an increase of nearly 20% on borrowing costs), and only approached 1980 levels again in 1983. The reduction in pollution control investments has been consistent with changes in total investment. In fact, pollution abatement investments have been a gradually declining share of total new plant and equipment expenditures since 1975.

In sum, declines in real business investment for pollution controls since 1980 reflect the operating life of conventional pollution controls -- investments in replacement equipment generally are not expected for several years. In addition, pollution reductions often are realized through modernization and process changes that are not reflected in the national accounts as "pollution control investment." The decline also reflects the fact that many toxics controls do not require investments in new equipment.

HAZARDOUS AIR POLLUTANTS--PREREGULATORY EVALUATION

[Clerk's Note: The materials referred to in the March 12, 1986, hearing on the EPA fiscal year 1987 budget were received by the subcommittee. Because of their voluminous nature, they will not be printed in the hearing record but will be retained in the subcommittee files.]

QUESTIONS SUBMITTED BY SENATOR WEICKER

ESTUARINE RESEARCH -- LONG ISLAND SOUND

Question: Given that two states and one interstate agency are involved, and that two regions of EPA and two federal agencies wish to play consequential roles in the program, coordination of research and data collection activities is critical and difficult. At present the Long Island Sound, Narragansett Bay and Buzzards Bay studies are managed by a single individual. Does this permit a proper level of attention to the Long Island Sound study?

Answer: The three northeast estuaries are not managed by a single individual. EPA Region I has individual coordinators for each of the northeast estuaries. In addition, another individual is coordinating the citizens advisory committees for all three estuaries as well as coordinating contractual reporting. A Division Director and Section and Branch chiefs also spend significant amounts of time supervising these efforts. In addition to Region I, Region II provides a Long Island Sound co-ordinator and their Division Director serves as chairman of the Management Committee.

COORDINATION OF ESTUARINE PROGRAMS

Question: To what extent are EPA resources being effectively utilized to interact with other federal agencies? How has the agency used the resources of other Federal agencies, state and universities in the effort to identify pollution problems and to develop abatement measures?

Answer: By the development of a local Management Committee consisting of representatives from NOAA, state agencies, academic institutions, and citizen groups, EPA has maximized the integration of ongoing programs in estuary studies. The specific mix of resources has depended on the proximity of other agency programs and the relationship of our priority problems to their interests. For instance, NOAA National Marine Fisheries Service (NMFS) has used Long Island Sound program money as a seed to expand a program studying the extent of pollution impacts on winter flounder and reprogrammed other efforts to study pollution impacts on shellfish in the Sound. NOAA-NMFS also chairs a living marine resource working group in Long Island Sound which coordinates program efforts with other State and Federal Agency efforts. NOAA Oceans Assessment Division has used Long Island Sound money to refine an inventory of coastal pollutant discharges they were compiling at a national level.

Other examples of how these program efforts have effectively supplemented other agency programs include a Food and Drug Administration intensive survey of water quality in a Buzzards Bay embayment as part of their efforts to understand the cause of shellfish bed closures there. The States of Massachusetts and Connecticut have supplemented CWA Sec. 106 survey monies with estuary program monies to expand water quality monitoring coverage. In Narragansett Bay, EPA has jointly funded two studies with NOAA Sea Grant. In FY 1986, these coordinated efforts are expected to be expanded.

RESOURCE ALLOCATIONS -- ESTUARINE PROGRAMS

Question: What are the resource allocation mechanisms within each of the individual estuarine research programs? To what extent are these decisions made locally or centrally?

Answer: Each estuary uses a similar resource allocation mechanism. The Management Committees develop a long-range plan in each estuary and an annual work plan for the specific fiscal year. This work plan is developed on the recommendations of the citizens and technical advisory committees and/or working groups on specific subject areas, such as living marine resources or water quality. Subject areas considered to be monitoring or implementation efforts under the normal purview of other Federal or state agencies are made available for funding to those agencies. Research items are publicly announced (RFPs) for funding as cooperative agreements with 5% cost sharing. Proposals are reviewed by outside reviewers and summarized by the Technical Advisory Committees. Final proposal selection and funding decisions are made by the Management Committee or some sub-set of that committee. Finally, funding decisions are made locally within each estuary. EPA oversight at the national level provides for the transfer of information among estuary studies to provide for technology sharing and to avoid duplication.

CLEAN LAKES

Question: According to the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and the 305b reports, our nation is losing the battle to protect and restore our lakes. What does the Environmental Protection Agency (EPA) plan to do in terms of protecting and restoring these vital resources?

Answer: It is the Agency's position that lake eutrophication is an intrastate water quality problem and lake restoration and protection is most appropriately handled by the States in conjunction with other water quality priorities.

QUESTIONS SUBMITTED BY SENATOR D'AMATO

SUPERFUND PROGRAM

Question: Mr. Thomas, I mentioned in my testimony the urgent need for interim funding for the Superfund Program. Are you willing to support an immediate extension of this funding in order to avoid any interruption of the Program?

Answer: At this time, the Agency is willing to accept interim funding in order to avoid long term permanent damage to our contract infrastructure. We have asked for a one year interim funding measure at $861 million. That amount would be sufficient to get the Superfund program back to the level of activity we had developed prior to our funding problem.

We would also accept a shorter term extension even though such a measure would be far from ideal and would severely restrict Superfund from fulfilling the basic mandate of our legislation. We would strongly prefer that such a measure be financed by an extension of the existing taxing authority.

ACID RAIN LEGISLATION

Question: Does EPA intend to send to Congress a legislative proposal to deal with the acid rain problem? Are you prepared to support any current proposals before the Senate, such as S. 52 or S. 283?

Answer: At this time, we believe that it is premature to send to Congress legislative proposals to deal with acid rain. Similarly, we find it premature to support current proposals before the Senate, such as S. 52 or S.283. As the Administrator has stated in the past, "When the fundamental scientific uncertainties have been reduced, this Administration will craft and support an appropriate set of measures to solve the acid rain problem." We are currently taking maximum advantage of the legislative authority provided in the National Acid Precipitation Act of 1980. We have expanded, accelerated and targeted the acid rain research effort to reduce those uncertainties as soon as scientifically practicable.

GREAT LAKES FUNDING

Question: I note that, in your testimony, you have indicated a funding level of $5.7 million for the Great Lakes Program. Could you clarify if this refers specifically to the Great Lakes Program Office's operating budget? Does EPA plan to fund additional Great Lakes programs beyond the operating budget of the Great Lakes Program Office?

Answer: The $5.7 million figure included $4.771,200 for the Great Lakes National Program Office in Chicago and $934,800 for the Office of Research and Development's Great Lakes program located in Duluth, Minnesota and Grosse Ile, Michigan.

TOXIC AIRBORNE POLLUTANTS IN THE GREAT LAKES

Question: Mr. Thomas, on October 17, 1985, you cosigned a letter with Thomas McMillan, the Canadian Minister of Environment, to various Great Lakes Environmental Administrators regarding work to assess the magnitude of chemicals that reach the Great Lakes via the atmosphere. I know that Environment Canada has indicated that this has been a problem on Lake Ontario. How is that work going? Is EPA moving to secure further funding on toxic airborne pollutants in the Great Lakes through joint monitoring programs and research studies such as those performed in the past at the Duluth facility?

Answer: While continuing to operate the Great Lakes Atmospheric Deposition Network, the Great Lakes National Program Office is conducting an intensive evaluation of both system design and adequacy of monitoring equipment. The redesigned system will focus on toxic organics and pesticides. Operation of the new system is expected to begin in FY 1987 and is covered within the FY 1987 Great Lakes budget. One of the goals of the reevaluation is to provide analytical compatability with Canada.

GREAT LAKES AMENDMENT TO CLEAN WATER ACT

Question: The Great Lakes amendment to the Clean Water Act deals with coordinating research and doing demonstration remediation plans in five of the International Joint Commission's Areas of Concern, one of which is the Buffalo River in New York. Does the EPA support this proposal?

Answer: The Agency has supported Great Lakes research activity and demonstration projects conducted under the authority of the Clean Water Act and in response to U.S. commitments under the Water Quality Agreements with Canada. The Agency's position on the Great Lakes provisions of the Clean Water Act proposal was that the Agency already has the statutory authority to carry out the activities specified in the legislative proposal, and that any demonstration projects should be selected on the basis of national environmental priorities.

Question: What other activities is the EPA undertaking in proposing remedial actions in IJC Areas of Concern surrounding the Great Lakes?

Answer: The Agency, through the Great Lakes National Program Office, is providing assistance to State and local agencies in the development of Remedial Action Plans for the 30 U.S. Areas of Concern identified by the International Joint Commission. The preparation, in FY 1986 and 1987, of these plans, which are designed to address the problems of in-place toxic pollutants in harbor sediment, is a top priority of the Agency's Great Lakes National Program. This is part of a bi-national effort being carried out in cooperation with the IJC's Water Quality Board, and in coordination with the Canadian government.

QUESTIONS SUBMITTED BY SENATOR ABDNOR

ASHAA PROGRESS REPORT

Question: Has ASHAA, which was enacted in 1984, been a successful program thus far? Can you provide the subcommittee with a brief progress report?

As the author of this asbestos-in-schools program, I take the Administration's consistent attempts to eliminate the program to heart -- especially in view of its success. The education advocacy groups, including the National PTA and the NEA, have praised the agency's administration of the program -- the agency staff, ably headed by Susan Vogt, has done a tremendous job of administering ASHAA.

Answer: EPA awarded $45 million in loans and grants on June 6, 1985 to 198 local education agencies for 417 abatement projects in 340 schools. To date, about 15% of the funds have been used for abatement by ASHAA awardees and about 20% has been released for expenditure by the awardees. Most awardees did not develop specifications and select contractors until after EPA announced award decisions on June 6th. As a result, most ASHAA-funded abatement work will be performed in the summer months of 1986.

EPA believes that the implementation of the loan and grant program was a success. A recently completed evaluation of the 1985 program conducted with the participation of a number of outside organizations produced valuable suggestions for ways to streamline the 1986 award process. However, the impact of the program in reducing asbestos hazards cannot be measured yet. EPA continues to believe that direct funding of abatement projects is not an appropriate use of federal resources.

ASBESTOS FINANCIAL ASSISTANCE

Question: Based on EPA's testimony before the Senate Environment and Public Works Committee last July, I understand there are a number of school districts that applied for ASHAA grants and loans but were unable to receive assistance do to the limited funds available. In your view, is there still a demand for abatement assistance in our nation's schools? How large a demand?

Answer: Based on information received in 1985 ASHAA applications, EPA estimated that there was approximately $200 million of abatement work which met the ASHAA criteria for severe asbestos hazards in financially needy schools. EPA does not have any data about whether the remaining unfunded abatement projects have since been completed. More current figures about the demand for abatement assistance should be available after EPA receives the 1986 ASHAA applications in late April.

CONTRACTOR CERTIFICATION

Question: If there is no further funding provided for ASHAA, to what extent would the agency continue to facilitate abatement contractor training and certification assistance to the states?

Has EPA allocated any funds, other than those provided through ASHAA, to ensure that asbestos abatement activities -- in schools and other buildings -- is being conducted in a safe, effective manner? Does your FY 87 budget request provide for a continuation of this important effort?

Answer: EPA's 1987 budget request contains $3.5 million to continue such programs as grants to states to set up contractor certification and training programs, asbestos information and training centers at five universities across the nation, and to distribute technical assistance and guidance to contractors, workers, and building owners.

PENDING ABESTOS LEGISLATION

Question: Are you aware of legislation introduced in both houses that would mandate reinspection of schools and require that potentially hazardous asbestos be abated? Have you anticipated what additional agency resources might be needed to administer such a program?

Answer: The Agency is aware of such legislation. Should this legislation become law, EPA will reprogram resources internally from the current asbestos-in-school inspection program to reinspection rule activities. There would be no net increase in resources for asbestos-related activities.

CWA REGULATIONS -- PIERRE, SOUTH DAKOTA

Question: Yesterday Mayor Grace Peterson of Pierre, South Dakota, brought to my attention a problem her city is having with respect to Clean Water Act regulations. I do not expect you to respond to her concerns today, but I would appreciate a detailed, written response to the points Mayor Petersen raised in a letter to the Region VIII Administrator, John Welles, as soon as possible. (I am providing you with a copy of the letter and supportive documents.)

Answer: Pierre, South Dakota has a Federally-funded treatment plant that is currently in violation of its NPDES permit. The discharge record shows a chronic difficulty meeting secondary limits due to the loading on the first stage of its rotating biological contactors (RBC). The Region attributes this to a design deficiency.

In May 1985, Region VIII issued Pierre an Administrative Order requiring the city to undertake an engineering evaluation of its plant to enable it to meet its secondary permit limits. Through an EPA-funded contract, the city performed an engineering evaluation of its treatment plant in September. The analysis showed that the chief performance limiting factor at the plant was the overloading of the RBC unit.

On February 28, 1986, the mayor of Pierre petitioned the Region VIII Administrator for relief from secondary requirements by requesting that the city's RBC process be considered an equivalent form of secondary treatment under the revised secondary regulations. The Region has reviewed this request and is planning to respond by the end of the month. The Federal regulations clearly indicate that the only treatment processes that are eligible for relaxed limits are trickling filters and waste stabilization ponds.

During the development of the regulation, all other biological treatment processes were found to be capable of consistently achieving secondary treatment requirements, including the RBCs used by the city of Pierre. The Agency analyzed at least two years of performance records from each of 324 facilities, including 27 RBCs.

QUESTIONS SUBMITTED BY SENATOR DOMENICI

CONSTRUCTION GRANTS FUNDING

Question: I am told that the Administration made a commitment in 1981 to fund a $2.4 billion EPA construction grants program for 10 years. This apparently was confirmed by your predecessor, Mr. Ruckelshaus, in testimony to the Senate Environment and Public Works Committee.

Was such a commitment made by the Administrator?.

Answer: To the best of our knowledge there was no such commitment by the Administrator. While many participants in the 1981 Amendment process understood there was such a commitment, we have been unable to locate such a commitment in our search of the record.

CONSTRUCTION GRANTS PHASE-OUT

Question: If so, why does the President's FY 1987 budget request propose to phase-out this program over the next four years?

Answer: We are working with a major Federal deficit, the size of which requires that we reexamine our priorities and reappraise our policies regarding the financing of Federal programs. In addition, the ability of States to assume full financial responsibility for this program has increased substantially over the last several years. The 1986 budget request reflected the Administration's proposed $6 billion, four year phaseout of the construction grants program. The 1987 budget request maintains the phaseout and is also consistent with the Administration's intent to fund completion of only existing phased or segmented projects.

Questions Submitted by Senator Proxmire

CLEAN LAKES -- NONPOINT SOURCE

Question According to the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and the Section 305b reports our nation's lakes are losing the battle for clean water. Over 1/3 of the documented lake problems are caused by nonpoint source pollution. How does the Environmental Protection Agency (EPA) expect to address this problem?

Answer It is the Agency's position that lake eutrophication is an intrastate water quality problem and lake restoration and protection is most appropriately handled by the States in conjunction with other water quality priorities.

ACID RAIN FOREST DAMAGE

Question: A recent report by a professor at Butler University said that midwest forest damage from acid rain is following the damage patterns seen in Germany's Black Forest and is as bad as damage documented in New England. What studies do you have of midwestern forests and are these studies as far along as for the north east?

Answer: The reports of forest damage in the Midwest have been associated primarily with ozone exposure or in some cases ozone in combination with sulfur dioxide. These effects are associated with isolated areas and do not provide indications of regional forest condition. As yet, there have been no regional surveys performed to detect regional air pollutant effects in the Midwest. The joint EPA/Forest Service research program has established a Mixed Hardwoods Research Cooperative to explore the condition of mixed hardwoods across its range, which includes the Midwest. The research strategy for the Cooperative involves a review of historical data on the influence of atmospheric deposition on mixed hardwood species and some exploratory research on potentially sensitive areas or "hot spots." The results of these activities, anticipated in mid-FY 1988, will guide the future direction of the Cooperative.

MID-APPALACHIAN TRACER EXPERIMENT

Question: You recently cancelled the Mid-Appalachian Tracer Experiment which tags emissions so that their paths can be followed across the country. Are there other ways to get this information?

Answer: The experiment to which you refer is known as the Cross-Appalachian Tracer Experiment (CAPTEX). This experiment was not cancelled. It has been completed.

This research effort involved a major field study jointly sponsored by the National Oceanic and Atmospheric Administration (NOAA), the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Electric Power Research Institute (EPRI), and the Ministries of Environment of Ontario and Quebec.

The purpose of the study was to follow the transport and diffusion of pollutants over long ranges in the atmosphere. During mid-September through October 1983, perfluorocarbon tracers were tracked from five releases from Dayton, Ohio and two releases from Sudbury, Ontario. The tracer was measured in samples collected from ground-level and aircraft samplers operated in the northeastern United States and Canada. The tracer was successfully measured as far away as 1100 kilometers and up to three days after release. The measurements provided data which were used to evaluate transport trajectory models and to analyze the dispersion of the tracer emissions following their release. The CAPTEX program has now been completed and a final report has been released (NOAA Technical Memorandum ERL ARL-142).

In an effort to provide additional information, we are planning a major field study called the Across North America Tracer Experiment (ANATEX). This study will utilize techniques similar to CAPTEX and is scheduled to be conducted during January through March of 1987. ANATEX will provide additional data from samples located as far as 3000 kilometers from two sources (Glasgow, Montana and St. Cloud, Minnesota). The experiment involves simultaneously releasing different tracers and considering a comprehensive set of meteorological and resulting transport conditions. Results from ANATEX are expected to become available to the scientific community in early 1988. It is expected that the ANATEX study would provide data for evaluating the transport components of long-range transport and dispersion models.

MEXICAN SMELTER

Question: I am concerned that a Mexican company will soon begin operations at a giant smelter close to the U.S. border. This smelter does not have the kinds of pollution controls required of U.S. plants. This plant is expected to pollute a large segment of the U.S. What do you plan to do about this?

Answer: EPA has been working with the Secretariat of Urban Development and Ecology (SEDUE) of Mexico to address air pollution problems caused by copper smelters along the Arizona-Sonora border, including the large smelter at Nacozari. SEDUE officials have committed to resolving air quality problems in the area. Mexicana de Cobre, the operator of the smelter at Nacozari, is in the process of selecting a contractor to build the sulfuric acid plant needed to reduce emissions of sulfur oxides. Construction of the plant should begin shortly. EPA and SEDUE are also discussing the possibility of interim emission requirements at the Nacozari smelter and other smelters in the area until permanent controls are in place.

Question: How do your actions regarding this smelter affect your strategy on U.S. acid rain impacting on Canada?

Answer: Although the air pollution problem associated with the smelters on the Arizona-Sonora border is significant, the problem is much less complex than the acid rain problem shared by the U.S. and Canada. The five-year U.S. - Canadian strategy for addressing acid rain, announced by President Reagan on March 19, 1986, covers a wide range of air pollution sources and involves a much larger geographic area.

PESTICIDE ACTIVE INGREDIENTS

Question: I know that E.P.A. has targets for the number of existing pesticides it will re-register each year. How many active ingredients have no gaps in required data and have been completely examined under the law? (I am concerned that the G.A.O. is coming out with studies showing no active ingredient has had complete data submitted.)

Answer: "Reregistration," as defined by the Agency, is an intermediate step in achieving the final goal of assessing the health and safety of previously registered pesticides.

Currently, reregistration is accomplished when the Agency establishes an updated regulatory position on an active ingredient (a registration standard). The registrants will have submitted a new confidential statement of formula, submitted an acceptable draft label, agreed to comply with the data compensation provisions of FIFRA, and agreed to submit all missing or inadequate studies within deadlines established by the Agency.

It should be noted that the emphasis of the registration standards program is to acquire and evaluate data on chemicals and develop appropriate approaches to managing their risks. Reregistration, on the other hand, concerns the status of individual products.

Although the Agency is reregistering pesticide products before it receives and evaluates all required data and completely reassesses these pesticides, an increasing number of our registration standards are now based on complete or nearly complete data. As results from the data call-in programs catch up with the registration standards schedule, these new standards will then reflect far fewer gaps in key data for toxicology and some other disciplines.

The Agency recently issued five registration standards proposals for chemicals which have fairly complete data bases and has invited public comment. These will be finalized following consideration of public comments. Furthermore, for each of the standards previously issued, the Agency plans to conduct Final Regulatory Standards and Tolerance Reassessments (FRSTRS) in future years. In 1986, a FRSTR is planned for Metolachlor, and at least one and probably several more are planned for 1987.

Complete data bases have been assembled for several chemicals covered by early standards, but in view of their low exposure, these chemicals have low priority for FRSTR's. The Agency is considering the issuance of a notice to announce that decision.

QUESTIONS SUBMITTED BY SENATOR JOHNSTON

ACID RAIN--ANALYSIS OF EXISTING STATUTES

Question: On January 8, 1986 Presidential Envoy Drew Lewis and his Canadian counterpart, the Honorable William Davis, presented the Joint Report of the Special Envoys on Acid Rain to their respective governments. The Report recommends, on page 45, that:

> "[b]oth the United States and Canada should review their existing air pollution programs and legislation to identify opportunities, consistent with existing law, for addressing environmental concerns related to transboundary air pollution."

Has EPA made an analysis of which statutes and regulations could be used to address transboundary air pollution? If so, please list these statutes and regulations, and describe prospective changes. If EPA has not done such an analysis, does the Agency intend to undertake an analysis of statutes and regulations as a result of the Report? If not, why not?

Answer: EPA has conducted a preliminary analysis of existing Clean Air Act (CAA) authorities and actions which effect sulfur emissions. This was done to better understand the interrelationship which exists between these actions and their potential for achieving additional reductions. A report, "An Integrated Sulfur Strategy Study, Concept Paper," was prepared which presents the results of this study. (Report attached) We believe this report can be expanded upon to respond to the Special Envoys' recommendation.

ACID RAIN -- FLEXIBILITY OF COMPLIANCE

Question: If SO_2 reductions are required as part of acid rain controls, has EPA considered flexible compliance options, in lieu of scrubbers or other coal cleaning equipment? Specifically, has EPA considered expanding the use of the bubble and other trading policies, or the use of natural gas, as ways to reduce compliance costs?

Answer: As part of EPA's ongoing analysis of acid rain policy, we are taking into consideration the potential application of bubble and trading policies and possible substitution of both natural gas and low sulfur coal for high sulfur fuels. It has been our general conclusion that acid rain control programs that are carefully designed and make some provisions for emissions trading can result in less costly emission reductions than those which do not. Care must be taken, however, in establishing the circumstances in which trading is allowed in order to insure that emission reduction targets are actually achieved.

INTEGRATED SULFUR STRATEGY STUDY

CONCEPT PAPER

Office of Air Quality Planning and Standards
December 20, 1984

APPENDIX

A REGULATORY CATALOGUE

I. Stack Heights Regulation

Section 123 requires the Administrator to promulgate regulations to insure that "the degree of emission limitation required for the control of any air pollutant..." is not affected by stack height for any source which exceeds "good engineering practice" (GEP) or by any other dispersion technique. The promulgation of these revisions to regulations is expected to modify the degree to which emission sources are permitted to take credit for the dispersive limitations. This, in turn, will affect the level of emissions control required of the sources before receiving operating permits.

II. Schedule

Proposal	11/84
Promulgation	1/85
Revise SIP submittals	10/85

III. Need for Action

Regulations previously developed to carry out this requirement were overturned by the U.S. Court of Appeals for the D.C. Circuit and a mandate was issued on July 18, 1984 requiring the promulgation of revised regulations by January 18, 1985.

IV. Key Issues

The key issues in this regulatory package concern how EPA defines certain terms in the regulation:

There are two ways of attaining the NAAQS: emission controls and dispersion techniques. Constant emission controls involves the use of technologies or limits that prevent pollutants from being generated or that remove pollutants from waste gas on a continuous basis. Dispersion techniques spread the emissions over a wider geographic area either by releasing the pollutant at a higher elevation (tall stack) or by varying the rate of emissions according to atmospheric conditions. Dispersion techniques have been used to meet the SO_2 standard more than to meet any other standard. Thus, they have contributed to the total atmospheric load of sulfur.

The key issues in the revision to the regulations involve: redefining several important terms including "dispersion techniques" and "excessive concentration," determining the amount of credit which a source may have to avoid downwash created by terrain obstacles, and determining what is an acceptable dispersion technique.

V. Nature of Impacts

It is estimated that this regulation could reduce emissions by 1 to 3 million tons per year depending on the number of affected sources which can justify their present stack height. Annual costs ranged from $300 million to $1,400 million. The effects will result from having to conduct additional demonstrations to justify stack heights, and from the reduction in stack height credits below what was previously allowed, consideration of terrain effects over long distances in fluid modeling studies, or use of previously permissible dispersion techniques. This reduction in credit may require more stringent emission limitations on many affected sources which will have to be met through the substitution of cleaner fuels or the application of additional control equipment. Affected sources include powerplants, industrial boilers, smelters and pulp and paper mills throughout the country.

Section 126 Determinations

I. The Agency has proposed to deny the petitions filed in 1980 and 1981 by Pennsylvania, New York, and Maine. These petitions alleged that midwestern States emit SO_2 which causes: 1. the SO_2 NAAQS to be violated and the SO_2 PSD increments to be interfered with in western Pennsylvania; 2. the formation of sulfates which in turn causes acid rain, TSP NAAQS violations, TSP PSD increment consumption, and visibility impairment.

II. Schedule

Proposed Determination	9/84
Final Determination	12/84

III. Need for Action

Section 126 requires a determination to be made within 60 days of receipt of a petition, as noted above, the petitions were filed in 1980 and 1981. In March 1984, the petitioning States filed suit against EPA to bring about a decision, the Court issued a decision in October 1984 requiring EPA publish its final determination by December 4th.

IV. Key Issues

The allegations raised by the petitioning States are:

1. Sources in Ohio and West Virginia emit SO_2 which is transported into western Pennsylvania causing violations of the SO_2 NAAQS and interference with Pennsylvania's PSD SO_2 program.

2. Sources in seven midwestern States emit particulates and SO_2 which transforms into particulate sulfates which are transported to the petitioning States causing acid rain, violations

of the TSP NAAQS, consumption of the TSP PSD increment and visibility impairment.

A number of important issues are addressed in the determination, including:

1. Section 126 applies only to criteria pollutants and pollutants for which there are PSD increments, not to acid rain and sulfates per se. Sulfates can be addressed as TSP however.

2. Section 126 does not apply to the "regional haze" form of visibility impairment since that type of impairment cannot be traced directly back to a source through visual techniques.

3. Section 126 may be applied to the cumulative effect of many sources rather than to the effect of a single source.

The record developed for the petitions did not support a finding that the midwestern States were causing or significantly contributing to a violation of a NAAQS, nor did the record show that those sources were interfering with the petitioning State's visibility programs.

V. Nature of Impacts

Denial of the petition will allow individual States to maintain the status quo, sources in the States alleged to be causing problems will remain subject to current SIP requirements, rather than having to meet more stringent emission levels which would result if the petitions were granted.

I. Intermittent Control Systems (ICS) Regulation

Section 123 of the Clean Air Act prohibits the use of dispersion techniques for meeting the national ambient air quality standards and other provisions of the Act. It only exempts from this prohibition those stack height that were "in existence" and those other dispersion techniques that were "implemented" as of December 31, 1970. The Agency, under Section 123 of the Clean Air Act (CAA), must propose rules that define "implemented" dispersion techniques before such can be used in a State implementation plan (SIP). Since the major dispersion technique other than tall stacks is the use of ICS, this rulemaking defines the necessary components of implemented ICS and sets forth basic guidance on incorporating ICS into a SIP.

II. Schedule

Proposal	9/84
Promulgation	9/85

III. Need for Action

This rulemaking will complete action under Section 123 of the CAA by addressing the allowance of this dispersion technique in SIP's. There are two sources: ASARCO in Tacoma, Washington, and ASARCO in El Paso, Texas, that have stayed court actions on the SIP emission limits pending EPA action on these rules.

IV. Key Issues

The key issues are what a source must show in order to obtain credit for an ICS and what a State must require of the source in order for that credit to be allowed in the SIP. The present package includes required components of an ICS and restrictions that should be included in the SIP. These directly affect the number of sources that could use an ICS in place of constant SO_2 emission controls.

V. Nature of Impacts

This action will affect very few sources, since most have installed constant emission controls or do not qualify as having a fully implemented ICS as of December 31, 1970. However, as previously mentioned, two major smelters and perhaps a few more sources will have sufficient economic motivation to pursue credit under this rule. For those sources, the ability to continue operation of an ICS may be important. Since they are major SO_2 emitters, this rule will affect total SO_2 loadings to some extent.

I. Visibility Federal Implementation Plans

The Agency is required to propose and promulgate implementation plans for States with mandatory Federal Class I areas that do not have approved visibility protection State Implementation Plans (SIP). The Agency will phase its action by promulgating the new source review (NSR) and monitoring strategy requirements first. This will be followed by the remaining portions of the rule, which include, integral vista protection, long term strategy to meet the visibility protection goal and examinations of existing major sources that are creating visibility impairment problems. These rules only address visibility impairment reasonably attributable to a single source or group of sources such as a specific plume, or a valley-fill situation. Action on regional visibility impairment will be addressed by future Agency action.

II. Schedule

	Plans for NSR & Monitoring	Remaining Portions
Proposal	10/84	6/86
Promulgation	6/85	2/87

III. Need for Action

The Environmental Defense Fund, et al. sued the Agency for failing to promulgate plans for the 35 deficient States. A settlement agreement was negotiated and signed by the court on April 20, 1984. The agreement calls for proposal and promulgation of the monitoring strategies in approximately 14 months, followed by the remaining parts of the rule over the next 14 months. The agreement allows EPA to delay either promulgation for up to 6 months if a State submits its own plan to meet the requirements.

IV. Key Issue

The key issue in the implementation of plans for the existing regulation that pertains to SO_2 control lies in the approach taken in monitoring. The monitoring systems that are set up under this rule will assess background levels of visibility impairment that could also be used for identifying and evaluating regional haze. Therefore, the selection of monitoring techniques and sites could provide useful data for future programs.

V. Nature of Impacts

In general, sulfur emissions do not cause specific plume visibility impairment since most sulfur is emitted in the form of SO_2, a colorless gas. However, SO_2 transforms to particulate sulfates which impair visibility by creating a regional haze. Only in a few isolated cases can that sulfate haze be reasonably attributed to a source or small group of sources, i.e. a stagnant air mass which traps the SO_2 in a valley, which is referred to as a valley-fill situation. Therefore, the implementation of the existing regulations will result in few, if any, controls on SO_2 emissions.

The program will provide information on background visibility conditions and on specific impairment from a source or group of sources and will begin in FY 86. The information can provide a basis for development of a regional haze program which could require controls on some SO_2 sources.

I. Block vs. Running Averages

Ambient monitoring data and modeling predictions regarding the 24-hour primary SO_2 standard and the 3-hour secondary standard have generally been based on block averages (i.e., 12:00 midnight to 12:00 midnight for the 24-hour standard and 12:00 a.m. to 3:00 a.m., 3:00 a.m. to 6:00 a.m., etc., for the 3-hour standard) although neither the block nor running averaging method is specified in the national ambient air quality standards (NAAQS). The EPA could require running averages (e.g., for the 3-hour standard, 12:00 a.m. to 3:00 a.m., 1:00 a.m. to 4:00 a.m., etc.) to be used for monitoring and modeling activities, and the requirement could be implemented through various mechanisms.

II. Schedule

Given, there is not yet an Agency decision on this issue, no schedule has been set. However, if there is to be a decision to specify either running averages or block averages, the Agency may decide to coordinate the schedule with the SO_2 NAAQS revision package.

III. Need for Action

There has been inconsistency in State and EPA monitoring and modeling activities with regard to the use of block and running averages. Several State implementation plan (SIP) revisions submitted to EPA (e.g., Muskingum River) have highlighted the different emission limits required between modeling with block and running averages. The EPA is currently under remand to review monitoring and data reporting regulations that pertain to averaging method although there is not necessarily a court directive to go to running averages for monitoring. The existing NAAQS does not specify either block or running averages.

IV. Key Issue(s)

One of the key issues is whether the block averaging method provides the level of protection envisioned in the SO_2 24-hour and 3-hour ambient standards. If the Agency decides to specify running, several issues arise with regard to implementing the change: Should all SIP emission limits be revised using running averages in the modeling analysis or should running averages just apply to future SIP revisions? Could EPA be forced to reconsider all sources even if it chose to apply running averages just to future SIP revisions? Should the ambient standards themselves specify running averages or should EPA policy or guidance be the mechanism to implement the change? What should the timing of the specification be in light of other possible changes in SO_2 control (e.g., stack height regulation, acid rain legislation, etc.)?

V. Nature of Impacts

The change to running averages could affect only sources included in future SIP revisions, or it could require a major revisitation of existing SO_2 SIP limits, depending on whether the change is implemented prospectively or in a manner to cover all sources. A major revisitation might not only result in additional control requirements for many sources, but it would also impose a burden on State and EPA resources to modify modeling procedures and review and/or redo previous modeling analyses.

Sources with emissions at levels which just meet the ambient standards based on block averages would most likely show exceedances with an analysis using running averages. Sources emitting at levels which correspond to predicted concentrations below the standards may have sufficient margin to accommodate an increase resulting from running averages. Modeling analyses would be required to determine this.

Monitoring data indicate that block averages may result in SO_2 concentrations that are on the average about 16 percent lower than concentrations based on running averages although the site-specific differences may range from 0-50 percent. Around utilities and other large point sources, the reductions may be larger and in some cases as high as 50%. If modeling data vary similarly to monitoring data, sources that are not at least 16 percent below the standards would likely have to lower their emissions (through control equipment, fuel switching, etc.). An informal review of recent SO_2 SIP revisions submitted to EPA (as of April 1984) indicates that the emission limits for about a third of the sources were set just at the level to protect the ambient standard so that running averages would probably result in exceedances for some of these sources. In addition, in the State of Ohio the SO_2 emission limits were set for each source at levels that would just protect the ambient standards.

I. SIP Emission Limit Averaging

A number of states have submitted SIP revisions which either are whole or in part rely on 30-day average SIP emission limits. The issue of the averaging period contained in an emission limit is critical because the averaging period determines the amount of control needed and the level of resultant air quality. At present, there is a wide range of emission limit averaging practices. Current practices range from short-term limits (3 to 24 hour) up to annual average.

II. Schedule

No formal schedule has been established.

III. Need for Action

EPA proposed to approve a Pennsylvania plan revision of this type in September 1981. It also has received a plan containing a 30-day average compliance provision from Indiana. Although final action has been delayed on the Pennsylvania plan, Section 110 mandates that EPA either approve or disapprove all revisions.

IV. Key Issue(s)

The key issue here is the length of the emission limit averaging period needed to protect the NAAQS (usually the 24-hour primary or the 3-hour secondary). The inherent variability of sulfur in coal coupled with the current deterministic form of the NAAQS makes it difficult to demonstrate that longer term limits will in fact always protect the

NAAQS. As noted above, there is a wide range of averaging periods used in current regulations. In addition, even where a short averaging period is stated or implied, sources sometimes comply on a longer term (30-day) basis.

V. Nature of Impacts

A national analysis of the impacts which a consistent national policy might have has not been performed. An indirect estimate derived from the SO_2 Regulatory Impact Analysis showed that a uniform national policy requiring short term limits might cause a reduction of as much as 3 million tons per year (TPY). However, depending on its content such a policy might also maintain current emission levels or even result in an emissions increase. Absent a direct study of this issue, all impact estimates should be regarded as highly uncertain.

I. Industrial Boiler NSPS for SO_2

This rule will affect new, modified, or reconstructed industrial, commercial, and institutional boilers larger than 100 million BTU/hr. Industrial boilers are one of the 56 source categories on the NSPS priority list.

II. Schedule:

Proposal	11/85
Promulgation	1/87

III. Need for Action:

Section 111 of the Clean Air Act requires that NSPS be promulgated for all source categories on the priority list by August 1982. The project is tracked in ATS.

IV. Key Issues:

The Clean Air Act mandates that NSPS for fossil-fuel fired industrial boilers include a requirement for a percentage reduction in uncontrolled emissions if the cost, environmental, and energy impacts are reasonable. The primary issue will be how to include percent reduction requirements in the NSPS. Percent reduction standards for SO_2, in effect, require the use of flue gas desulfurization (FGD) systems, whereas standards with emission limits permit the flexibility for boiler operators to select FGD, low sulfur fuels, or a combination of the two. Percent reduction standards for SO_2 generally are unpopular because FGD imposes higher capital and operating costs, produces a solid waste disposal problem, and discourages the use of coal in favor of oil or natural gas. Percent reduction standards are favored by eastern coal producers because they encourage the use of locally available coals and limit the penetration of western low sulfur coal into eastern markets. While the local coal issue was the major motivation behind the percent reduction requirement in the 1977 Act, industrial boilers have little impact on national coal markets.

V. Nature of Impacts:

The industrial boiler NSPS will reduce SO_2 emissions by between 200 and 400 thousand tons/year in 1990 depending on the amount of future coal use in industrial boilers and stringency of the standard. Since NSPS apply to new, modified, or reconstructed boilers, emission reductions will be greater in each successive year beyond 1990.

I. Refinery Fluid Catalytic Cracking (FCC) Regenerator NSPS

This rule affects new, modified, or reconstructed FCC regenerators at petroleum refineries. An NSPS for particulate and CO emissions from FCCU was promulgated in 1974; and this category, therefore, was not included on the NSPS priority list.

II. Schedule:

Proposal	1/84
Promulgation	4/85

III. Need for Action:

No court-ordered, statutory, or internal EPA deadlines.

IV. Key Issues:

The key issue is the cost effectiveness of the NSPS. The best control system for reducing SO_2 emissions is flue gas desulfurization (FGD). Reduction catalysts, which are not fully developed on FCC units, are less effective in controlling SO_2, but are potentially more cost effective in terms of cost per incremental pollution removed. The proposed NSPS is based on a trade-off between emissions and costs and is designed to allow the use of either FGD or reduction catalysts.

V. Nature of Impacts:

If all new units used FGD, fifth year SO_2 emission reductions would be about 76,000 tons per year. If all new units used regeneration catalysts, the fifth year reductions would be about 70,000 tons per year. Since NSPS apply to new, modified, or reconstructed facilities, emission reductions will be incrementally greater in each successive year, as will the difference between the impact of FGD versus reduction catalysts.

I. Onshore Natural Gas Processing NSPS

The rule affects new, modified, or reconstructed sweetening and sulfur recovery units in the natural gas production industry. This source category is one of the 56 categories on the NSPS priority list.

II. Schedule:

Proposal	1/84
Promulgation	1/86

III. Need for Action:

Section 111 of the Clean Air Act requires that NSPS be promulgated for all source categories on the priority list by August 1982. The project is tracked in ATS and SPMS.

IV. Key Issues:

The key issue is cost effectiveness of SO_2 control. While more stringent emission control systems have been demonstrated commercially the proposed NSPS is based on controls that do not exceed \$1900/ton of SO_2 removed. More stringent controls are economically affordable and could be required by the NSPS if benefits of SO_2 control are perceived to be greater than \$1900/ton.

V. Nature of Impacts:

The proposed NSPS would reduce SO_2 emissions by 95,000 tons/year in the fifth year after implementation. Since NSPS apply to new, modified, and reconstructed facilities, the emission reductions will be incrementally greater than 95,000 tons/year in each successive year.

I. Revision of NSPS for Fossil Fuel Fired Steam Generators, Subpart D (30-day rolling average):

The proposal affects large industrial and utility steam generators (> 250 million BTU/hr) constructed after August 17, 1971. Electric utility units constructed after September 18, 1978, would not be affected by this revision since they are subject to Subpart Da. The revision would establish the averaging time for determining compliance with the NSPS on a 30-day rolling average basis using continuous monitors as the compliance method. The current compliance method is a 3-hour stack test.

II. Schedule:

Proposal	10/83
Promulgation	10/85

III. Need for Action:

The regulation's compliance provisions for units burning complying coal are blank, and this absence of guidance has led to inconsistency among States in interpreting the NSPS. No statutory or court-ordered deadlines exist. The project is tracked in ATS.

IV. Key Issue:

The major issue is the selection of an appropriate averaging time. OAQPS views the revision as a technical correction that fills a void in the regulation and makes the NSPS consistent with the original technical basis (coal sulfur variability was not understood when the NSPS originally was promulgated so no averaging time was specified with the emission limit). NRDC has stated that they will litigate a 30-day rolling average on the basis that it represents an unjustified relaxation of the current NSPS. They maintain that the NSPS is a 3-hour average (a position that OGC believes has strong legal merit), that EPA has been lax in enforcement, and that NSPS should be a 3-hour average standard continuously enforced. The utility industry supports 30-day averaging (the averaging time for today's new boilers under Subpart Da) and would litigate any substantially shorter averaging time as being a retroactive and unjustified tightening of the NSPS.

V. Nature of Impacts:

The potential averaging times range from 3-hours to 30-days. Shorter averaging times will produce lower SO_2 emissions. Approximately 200 coal-fired industrial and utility steam generators are subject to Subpart D. About half comply by burning low sulfur coal and half use flue gas desulfurization (FGD) systems. The proposed 30-day rolling average would have practically no effect on current SO_2 emissions from Subpart D units. Depending on the compliance and enforcement conventions adopted with a 3-hour averaging time, most of these units could be out of compliance. Since there is very little coal in the U.S. reserve base capable of meeting the NSPS emission limit on a 3-hour basis, most of the Subpart D units that burn low sulfur coal would be forced to retrofit FGD systems. In addition, many of the units now using FGD would require upgrading to comply on a 3-hour basis. Averaging times in the range of 3-hours, therefore, would impose additional capital and operating costs on the electric utilities and interrupt ongoing coal contracts.

I. Review of NSPS for Electric Utility Steam Generators (Subpart Da)

The purpose of the review is to determine if the NSPS for utility steam generators should be revised. The review will assess advances in the state-of-the-art in SO_2, particulate, and NO_x emission control technology. If the review indicates that the NSPS does not reflect best demonstrated control technology (considering energy, environmental, and economic impacts), then a rulemaking will commence.

II. Schedule:

Review 1/86

III. Need for Action:

Section 111 of the Clean Air Act requires that each NSPS be reviewed and, if appropriate, revised every 4 years.

IV. Key Issues:

The major issue will be whether or not to revise the SO_2 standard. Because of major contribution of utilities to SO_2 emissions, concern over acid deposition may generate pressure to tighten the SO_2 standard. Advancements in demonstrated SO_2 control technology appear to be relatively modest. The technical review of Subpart Da probably will serve to prove that the controversially tough position the Agency took on the state-of-the-art of flue gas desulfurization performance was justified. Little further SO_2 reductions from NSPS are likely at this time based on control technology advancement. If, however, the Agency's goal is to reduce SO_2 emissions, then the maximum emission limit in the standard could be revised to preclude the use of high sulfur coals in new sources. A lower emission limit would reduce SO_2 emissions, but would run counter to one of the objectives of the 1977 Clean Air Act Amendments--to foster the use of locally available coal. Lowering the emission limit would generate substantial concern by eastern coal producers and would be difficult to sustain under the current Act.

V. Nature of Impacts:

The impact of a revised SO_2 NSPS would depend on how aggressive the Agency wants to be, but any revision directionally would reduce SO_2 emissions.

I. Revisions to the Guideline on Air Quality Models

The purpose of this action is to amend 40 CFR 51.24 and 40 CFR 52.21 to refer to an updated and revised Guideline on Air Quality Models and to prepare that guideline document.

II. Schedule

Proposal 12/84

Promulgation 3/86

III. Need for Action

The "Guideline on Air Quality Models" is widely used both by EPA in reviewing PSD permits and State Implementation Plan (SIP) revisions and by private industry and States in the preparation of PSD permits and SIP revisions. The guideline serves as a means by which consistency is maintained in air quality analyses. At the time of the initial release of this guidance in 1978, EPA anticipated that periodic revisions would be necessary, since air quality modeling is a rapidly expanding field. Revisions were presented at public meetings in October 1980. Public comments from those meetings indicated that considerable effort was needed to respond appropriately to various technical concerns. As a consequence, programs were begun to solve the technical problems identified during those meetings. Although many of these programs will be continuing for several years, there is sufficient new information now available to revise the guideline and respond to the public concerns identified in 1980. Furthermore, much of the information in the 1978 guide is obsolete and no longer used by Regional Offices. A new guide reflecting current policy and procedures is needed.

IV. Key Issues

There are six main issues associated with this rulemaking: (1) timeliness of the action given the potential impact of CAA revisions; (2) the models selected for inclusion in the guideline and for "preferred status"; (3) demonstration requirements for the user of other models; (4) the need for regulatory consistency vs scientific flexibility; (5) potential conservatism of model estimates; (6) a variety of technical issues including such topics as meteorological data requirements, variations in plume behavior and selection of receptor sites. Each of these issues has been resolved in the guideline development processs and accepted through Red Border review.

V. Nature of Impacts

It is anticipated that this action will have minimal impact. The revised guidance is already being implemented under the 1978 guideline or as a result of supplemental guidance contained in "Regional Workshops on Air Quality Modeling: A Summary Report," EPA-450/4-82-015. The revised guideline more clearly organizes this guidance and formalizes it in the regulations.

I. Addressing Uncertainty in Model Estimates

This effort is designed to examine the potential impact on regulatory control strategies of addressing uncertainties in model estimates. Procedures being developed will allow the decision maker to understand the extent to which (1) the ambient standards may be overprotected or (2) the ambient standards may not be protected and to make a reasoned judgment on the appropriateness of emission limits. This program could lead to a policy change regarding the way States express emission limits and/or the way the Agency interprets the attainment provisions of the Act.

II. Schedule

The program is currently separated into two activities (1) accounting for model uncertainty and (2) the effect of emission rate variation. Current program commitments specify that preliminary examples of the potential effect that consideration of uncertainty may have on emission limits be completed early FY 85. Continuation of the effort to account for emission rate variation is anticipated in FY 85 with guidance to Regions and States following.

III. Need for Action

There are no specific statutory nor regulatory requirements for development of the subject guidance. See, however, discussion under IV.

IV. Key Issues

A. EMISSION RATE VARIATION. Sources where the emission rate varies substantially over short periods of time, such as coal-fired power plants, are not adequately addressed by the normal procedures for establishing emission limits. Emission limits based on the maximum emission rate possible may overestimate the potential environmental impact of the source because the maximum rate is achieved only rarely and may not occur under the meteorological conditions most conducive to maximum concentrations. Emission limits based on variable rates of emission requires the development of criteria that allow acceptable risks of violations to be considered.

B. UNCERTAINTY IN MODELING. There are inherent uncertainties in ambient concentrations predicted by air quality dispersion models. They result from two primary causes: (1) inability of the model to precisely represent the random nature of atmospheric dispersion, and (2) imprecision in the measurement of source characteristics or ambient conditions.

V. Nature of Impacts

A. EMISSION RATE VARIATION. The class of sources potentially affected by this program includes coal-fired power plants, nonferrous smelters, and petroleum refineries. While efforts to quantify the impact on power plants is proceeding, the actual impact will depend on the stringency level chosen as the benchmark against which source impacts will be compared.

B. UNCERTAINTY IN MODELING. The actual impact on emission limits and thereby sulfur dioxide loadings is difficult to predict. The primary intent of this effort is to provide the decision maker with a quantitative asessment of the quality of any particular decision. An analysis, not yet underway, could be conducted to examine the impact of specific decision criteria on the establishment of emission limitations and to compare with current operating practice.

I. Title and Short Description - Continuous Emission Monitoring (CEM) Implementation

During FY 1985, SSCD, through its Continuous Compliance Strategy (CCS) guidance and the SPMS, specified that each Regional Office initiate at least a minimum CEM program, with priority attention being given to fossil-fuel-fired steam generators subject to NSPS Subparts D and Da. Additional (non-NSPS), larger SO2 emitting boilers may be given high priority attention in subsequent years. The Agency believes that continuous monitoring of SO2 emissions may possibly lead to reductions from such sources.

II. Schedule

This new initiative will start in FY 1985. It may be expanded to address additional (non-NSPS) large boilers in subsequent years.

III. Need for Action

This initiative was undertaken as a result of SSCD's reexamination of the overall compliance status of stationary sources of air pollution and agency compliance techniques and strategies. The results of this examination were reported in two documents entitled: (A) "Compliance Strategy for Stationary Sources of Air Pollution" (dated January 1984); and (B) "Strategy to Assure Continuous Compliance by Stationary Sources of Air Pollution" (dated April 1, 1984).

IV. Key Issues

A. Are there SO2 emissions from sources which could be reduced if the Agency increased its CEM efforts? SSCD believes that the answer is in the affirmative. However, the basis for this opinion is not well quantified. Therefore, a number of items, including the following, should be addressed first.

emission standards are. This must include not only the numerical values of the standards but also their averaging periods, the numbers and types of exemptions, and the compliance test methods.

o Given such an understanding, do the key SO2 emitters exceed their standards (based upon credible CEM data)?

B. If excess SO2 emissions are identified by the CEMs, will the State agencies require the sources to reduce their emissions, or will they simply relax the SIPs (up to the source's emission level)?

C. Will the Agency apply resources and give priority attention to a SO2 reduction plan based on expanded implementation of a CEM program?

V. Nature of Impacts

SSCD's FY 1985 CEM initiative, at the most, will result in continuous SO2 monitoring at about 200 NSPS boilers. There's currently virtually no reliable data upon which to estimate how much excess SO2 emissions come from these units. However, it is believed that such units are substantially in compliance. Therefore, one would expect very little, if any, SO2 emission reduction to result from the initiative. Furthermore, if there were any to be obtained, due to technical and programatic lag-time, they probably would not occur until FY 1986 or later.

To the extent that the CEM initiative is expanded after FY 1985 to address non-NSPS, large SO2 emitting sources, it is estimated that such a program could yield measurable SO2 emission reductions. This presumes that the CEM data documents a measurable quantity of excess SO2 emissions (above that allowed in each SIP) and that the States enforce their SIPs rather than relaxing them. However, the quantitative basis for reasonably estimating the potential reductions from these sources is not available, nor are there any specific plans to acquire such data.

I. Fine Particle NAAQS

This secondary standard would define acceptable ambient levels for fine particles (those smaller than 2.5 m) and be based mainly on visibility effects. Because sulfates derived from SO_2 emissions are a major component of fine particle levels, such a standard could materially affect SO_2 SIPs.

II. Schedule

Proposal	9/86
Promulgation	9/87
Compliance	"Reasonable time"

III. Need for Action

In the PM_{10} proposal, the Administrator deferred a decision on a possible secondary fine particle standard to await further developments relating to acid deposition and analysis conducted by the visibility task force. Two environmental groups have issued an intent to bring suit to force the Agency to make the decision as a part of the current PM standard revision.

IV. Key Issues

The principal basis for consideration of a secondary fine particle standard is related to relatively well quantified effects on visibility. The key issues are:

1) Whether a secondary NAAQS for fine particles is needed to protect or improve visibility.

2) What minimum level(s) of visibility impairment by fine particles constitute an adverse effect on public welfare.

3) Whether the standard should be set to focus only on the eastern portion of the U.S. or include the west.

4) How would such a secondary standard be implemented, given the complexities of long range transport multiple source impacts, and substantial costs.

V. Nature of Impacts

The impacts of this action could be minimal to substantial depending on the level of the standard selected and the ultimate implementation requirements imposed by the Agency. The original staff range of interest for a seasonal (3 month average) fine particle standard (8 to 25 g/m^3) is bounded at the upper end by current conditions and at the lower end by natural background. Quantitative analyses of the impacts of alternative standards are not available but some idea can be inferred from the draft analysis of alternative regional SO_x strategies conducted by SAI. In this analysis, a 12 million ton SO_2 emission reduction costing approximately $9 billion/yr would result in visual range improvements on the order of 20 to 30% in large regions of the eastern U.S. The estimated economic benefits of such improvements range from $1 to 4 billion/year. Implementation of a fine particle standard (as opposed to a sulfate standard) would likely involve control of other sources of particle emissions as well.

QUESTIONS SUBMITTED BY SENATOR LAUTENBERG

SUPERFUND SLOWDOWN

Question: I understand that you began the first phase of your Superfund shutdown plan last month. You have sent out notices of potential contract terminations to your major contractors and are compiling furlough registers. The next phase is scheduled for the first of next month when you plan to terminate two major contractors. Who are these contractors? With which projects are they involved?

Answer: If we decide that some termination action is necessary, the first contracts to be affected would be the two Field Investigation Team contracts, which provide remedial technical support (these contracts are held by the NUS Corporation and the CH2M Hill Corporation), and the Technical Assistance Team Contract, which provides removal technical support (this contract is held by the Roy F. Weston Company).

Question: Is it absolutely essential to terminate these contractors as of the first of April? What would it cost to delay this action for two weeks or a month, if we are close to providing funding?

Answer: We are in the process of evaluating if and when any contractors must be terminated. No decisions have yet been made. We will be taking all possible steps to avoid having to resort to ending contracts permaturely. Assuming the two month interim funding measure of $150 million which was passed by Congress on March 21 is signed, this will alleviate the need to terminate these contracts.

SUPERFUND CONTRACTORS AND SUBCONTRACTORS

Question: Would you please supply a list of all of your prime contractors and subcontractors?

Answer: The following list shows our prime contractors and subcontractors.

SUPERFUND CONTRACTORS & SUBCONTRACTORS

I. CONTRACT LABORATORY PROGRAM (CLP)

Prime Contractors	Subcontractors
A. University of Las Vegas	
QA Verification	None
B. VIAR & Co.	
Sample Management Office	None

Note: There are 81 Contract Laboratories in the CLP.
There are no Subcontractors.
The six largest Contract Laboratories are:

1. California Analytical Laboratories, Inc.
2. Chemtech Consulting Group, LTD.
3. Compu/Chem Laboratories
4. IT Corporation
5. Rocky Mountain Analyticl Lab. Inc.
6. U.S. Testing Company, Inc.

II. REMEDIAL PROGRAM

Prime Contractors	Subcontractors
A. Camp Dresser and McKee, Inc.	
REM II	C.C. Johnson and Associates, Inc. Clement Associates, Inc. ICF Incorporated Roy F. Weston, Inc. Woodward-Clyde Consultants, Inc.
B. CH_2M Hill Southeast, Inc.	
REM/FIT Zone II	Ecology and Environment, Inc.
C. CH_2M Hill Southeast, Inc.	
REM IV	Black and Veatch Consulting Engineers, Inc. Ecology and Environment, Inc. IFC Incorporated Planning Research Corporation
Prime Contractors	Subcontractors
D. EBASCO Services, Inc.	
REM III	AEPCO, Inc. Aquatec, Inc. C.C. Johnson and Associates, Inc. E.C. Jordan Company Environmental Science and Engineering, Inc. Environmental Testing and Certification Corportio ICF Incorporated NUS Corporation Technos Inc. Weston Geophysical, Inc.

E. NUS Corporation	
REM/FIT Zone I	Brown and Root Development, Inc.
F. The Mitre Corporation-Metrek Division	None

III. Removal Program

Prime Contractors	Subcontractors
A. Hazardous Waste Technology Services	
ERCS Zone II	Associated Chemical & Environmental Services Inc.
	Alert Laboratories, Inc.
	Chemway Consultants, Inc
	Cliff Berry, Inc.
	CMC, Inc.
	Coastal Divers and Pollution Control, Inc.
	Danmark
	Environmental & Toxicological Consultants, Inc.
	Environmental Coastal Pollution Cleanup Services Inc.
	Enviropact. Inc.
	Environmental Safety Designs, Inc.
	Ferguson Harbor Services, Inc.
	Georgia Institute of Technology
	Gulf Coast Environmental, Inc.
	Hess Environmental, Inc.
	Hulcher Emergency Services, Inc.
	Jacksonville Spillage Control Association
	Modern Petroleum Technology
	Need-A-Diver Marine Services, Inc.
	Peterson Maritime Services, Inc.
	Shenandoah Environmental Services
	Triangle Resources, Inc.

Prime Contractors	Subcontractors
B. O.H. Materials Company	NY-TREX/Env. Pollution Control Services, Inc.
ERCS Zone I	PEDCO Environmental, Inc.
	Samsel Service Company
	Whan Contruction Company
	Total Chem Services, Inc.
	Cambridge Analytical Assoc.
	R.A.H. Consulting
	Industrial Marine Services, Inc.
	Thomas F. Dalton, FAIC
	R.E. Wright Associates, Inc.
	Stablex - Reutter, Inc.
	Centec Analytical Services, Inc.

Peck Env. Laboratory, Inc.
Resource Analysts, Inc.
Lancaster Laboratories
Steam Kat Corporation
George, Miles & Buhr
Shenandoah Env. Services

Marine Pollution Control C.M.C., Inc.
Industrial Waste Removal, Inc.
New England Marine Contractors, Inc.
B.E.S. Env. Services, Inc.
Invirex Demolition Services, Inc.
SLC Consultants/Contractors, Inc.
Rochester Drilling Co., Inc.
Will-Webster, A Joint Venture
Aaxon Industrial, Inc.
Universal Environmental Corporation
Mid-Atlantic Refinery services, Inc.
K-Cooling
Kenneth M. Dunn Co. Inc.
T&M Equipment Corporation
Inland Pumping & Dredging Corp.
D'Appolonia Waste Management
  Services, Inc.
Hulcher Emergency Services, Inc.
Geotec Corporation
Clear Ambient
Allwash of Syracuse, Inc.
Inland Pollution Control
Morna Crowley Env. Services
Clean Venture
Jet-Line Services, Inc.
Sealand Environmental
AMO Pollution Services, Inc.

Prime Contractors Subcontractors

Resource Technology Services
Clean Industry, Inc.
CH_2M Hill Southeast, Inc.
Enviro-Chem Waste Management
  Services, Inc.
Env. Testing & Cert. Corp.
IT Corporation
James Petrica & Assoc. Inc.
Canberra/RMC
Versar, Inc.
Guardian Construction Co., Inc.
E. Gilarde Construction Co.
EMPAK Field Serv. Group
Marlyn Services Corp.
East Coast Env. Services Corp.
Pollution Control Unlimited
KLM Engineering

C. PEDCO Environmental,
  Inc.

ERCS Zone III	O.H. Materials AAA Env. Industries., Inc. Environmental Enterprises Inc. General Drainage, Inc. Mid-America Env. Services, Inc. Pollution Control Co. Spill Recorvery of Indiana Berg Oil Co. Petrochem Services. Inc. Charles H. Hamilton Co. SCS Engineers Environmental Pollution Control Services, Inc. Andersen Builders of Superior, Inc. Samsel Services Co.
D. Riedel Environmental Services, Inc.	
ERCS Zone IV	IT Corporation U.S. Pollution Control, Inc. Woodward - Clyde Consultants Gulf Coast Waste Disposal Authority Kemp and Hoffman Northwest Tank Alaska Offshore, Inc. Bud's Oil Service Empak, Inc.
E. Roy F. Weston, Inc.	
TAT	Tetra Tech., Inc. Jacobs Engineers - Group, Inc. CoCo Johnson and Associates, Inc. ICF, Inc.

IV. ENFORCEMENT PROGRAM

Prime Contractors	Subcontractors
A. GCA Corporation	
TES I	Clement Associates, Inc. Metcalf and Eddy, Inc. Tech Law, Inc.
B. Planning Research Corporation	
TES II	Booz-Allen and Hamilton, Inc. GCA Corporation Intera Technologies, Inc. Jacobs Engineering Group, Inc. Life Systems, Inc. Putnam, Hayes and Bartlett, Inc. Tech Law, Inc. Versar, Inc.

V. GENERAL SUPERFUND SUPPORT

Prime Contractors	Subcontractors
A. Bionetics Corporation	None
B. Booz-Allen and Hamilton, Inc.	None
C. CH$_2$M Hill Mid Atlantic, Inc.	Engineering and Economic Research, Inc. Environ, Inc. Environmental Law Institute, Inc. ICF Incorporated Versar, Inc.
D. Foster-Wheeler Enviresponse, Inc.	NUS Corporation Princeton Aqua Science, Inc.
E. ICF Incorporated	None
F. I-Chem Research, Inc.	None
G. Lockheed Engineering Mgmt. Services Company, Inc.	None
H. Northrop Services, Inc.	Research Triangle Institute, Inc.
I. Tech Law, Inc.	None
J. Techenor, Resler, and Eiche, Inc.	Charles S. McBride and Associates, Inc. Conrad and Associates, Inc. Cotton and Company

Question: If you postpone the actions you plan for April 1 for a couple of weeks or a month, why can't you absorb the additional costs within the $50 million you still have available?

Answer: To do so would mean either tapping the funding we have reserved for staff or changing program priorities. In the first instance, we have no assurances that interim funding would be available when we needed to pay salaries later in the year.

In the second case, to fund these contracts might mean that later on higher program priorities for enforcement efforts or removal actions might be jeopordized.

NORTH RIVER AND RED HOOK SEWAGE TREATMENT PLANTS

Question: Do you expect that the North River and Red Hook sewage treatment plants will meet the court imposed deadlines for construction and operation of primary and secondary treatment?

Answer: The North River and Red Hook Sewage treatment plants are expected to meet the court imposed deadlines for construction and operation of primary and secondary treatment facilities.

- North River is scheduled to be substantially complete and to start up its primary tank operation by May, 1986; and to have its primary tank fully operational by August 1, 1986. North River appears to be ahead of schedule.
- Red Hook is scheduled to be substantially complete and to start up its primary tank operation by May 1, 1987. Red Hook appears to be on schedule.
- North River is scheduled to be substantially complete and to start up its secondary treatment system by May 1, 1991; and to have its secondary treatment system fully operational by August 1, 1991.
- Red Hook is scheduled to be substantially complete and to start up its secondary treatment system by May 1, 1989; and to have its secondary treatment system fully operational by August 1, 1989.

NORTH RIVER SEWAGE TREATMENT PLANT

Question: Will the North River plant be operational prior to the opening of the New York City Convention Center? If not, what treatment will Convention Center wastewater receive?

Answer: There is no known problem that would prevent the New York Convention Center from discharging into the North River Plant after May 1, 1986.

PERMIT ISSUANCE

Question: The Administration's 1985 bill to amend the Clean Water Act provided for an extension of the NPDES permits period of from 5 to 10 years. This change was proposed in part to reduce permit backlogs. Yet you justified your proposed reductions in the water program in part because of the elimination of major permit backlogs. How do you reconcile these views?

Answer: The Administration's 10-year permit term proposal and our budget request are not inconsistent. Under the Administration's statutory amendment, the EPA Administrator would establish, by rule, maximum permit terms of up to 10 years as appropriate for various categories of discharges. The flexibility provided by the 10-year term would be used primarily for minor sources. Major sources that may have a significant environmental impact would have shorter permit terms. Potential discharges of toxic chemicals in toxic amounts would be limited to a five-year term. However, minor discharges that have little or no impact on water quality and for which limits are unlikely to change could receive larger terms of up to ten years.

In recent years, the Agency has significantly reduced the EPA and State backlog of expired major permits. However, despite substantial increases in outputs expected in 1987, the backlog of expired minor permits is still very large. For many of these permits, a ten year term would be one tool to help prevent new backlogs from occurring.

Preparation and issuance of major permits usually requires more resources than minor permits. With the major reduction of the major permit backlog, our budget request can reflect a reduction for the water program and still provide resources to begin addressing the minor permit backlog.

CONSTRUCTION GRANTS

Question: Your construction grants proposal includes the no new-starts policy. Last year the Congress adopted my amendment to overturn this policy both for FY 85 and FY 86 funding. Please submit to the Committee a list of all projects which would be affected by your no new-starts proposal if it were implemented.

Answer: In order to identify the specific information desired, we contacted Eric Erdheim of your staff. Based on our conversation, we will provide to the Committee with a State-by-State listing of the estimated total number, population, and dollar value of projects affected by the no new-starts proposal. We also will provide a detailed project listing for the State of New Jersey by April 9, 1986. The data will be based on the 1984 Needs Survey Year 2000 needs, using currently eligible funding categories and all three levels of data reliability noted in the Needs Survey. In the meantime, we have attached the most recent listing of currently phased/segmented projects that would receive funding under the Administration's proposal. The data for the State of New Jersey show a total of 113 projects with a Federal share of $920.8 million.

Question: How many municipalities need to begin construction to achieve the July 1988 deadline?

Answer: An estimated 2,580 municipalities need to begin construction to achieve the July 1988 deadline. This number does not include those noncompliant municipalities that have an active grant for improving their wastewater treatment facility.

Question: How many of these are not phase/segmented projects?

Answer: None of the 2,580 municipalities are grandfathered phase/segmented projects. The estimated 150 non-compliant phase/segmented facilities have already received one or more grants under the construction grants program and have consequently begun construction.

STATE WATER GRANTS

Question: What impact will your proposed reduction in state water grants have on the state's ability to manage their water quality program?

Answer: We anticipate that the reductions to water grants will be in proportional amounts for the State functions (monitoring, planning, nonpoint source control, permitting, enforcement, etc.) which we presently fund.

However, State funding for these activities is currently greater than the EPA contribution. We estimate that the States now provide about $120 million annually for these same functions. Given the continuation of State funding and the level of 106 funding we propose, we believe that essential pollution control activities will continue, provided that available funds are targeted to critical water quality problems. Using the priority waterbody list approach, EPA will increase its efforts to direct its grant funds to identify and resolve the highest priority problems in each State. Consequently, available funding will be used more efficiently, and priority water quality problems will be addressed.

Question: What impact will the proposed reduction have on efforts to address groundwater and nonpoint source pollution problems and to enforce the July 1988 sewage treatment deadline?

Answer: While the proposed reductions may result in reduced nonpoint source and groundwater pollution control efforts, these programs are currently being operated more as pilot projects than as national pollution abatement programs.

Similarly, while we estimate that less than $2 million in 1987 106 funds will be devoted to nonpoint source efforts, a 20% reduction in this figure will not result in a major change in State programs.

In the case of both nonpoint source and groundwater programs, in States where these are priority activities, a combination of State and EPA funding can be focussed on the problems. As was pointed out in a previous answer, EPA is using the priority waterbody concept to assure that available funds are targeted on the highest priority water quality problems.

With regard to the impact of the proposed reduction to enforce the July 1988 sewage treatment deadline, this is a high priority activity which does not require large amounts of funding. We do not anticipate that the proposed funding reduction will significantly affect this goal.

ASBESTOS-IN-SCHOOLS PROGRAM

Question: The Administration has not requested any funds for grants and loans under the Asbestos School Hazard Abatement Act. Based on applications that were submitted last year for ASHAA funding, how many schools with severe asbestos hazards and limited financial resources do you estimate will be unable to do asbestos abatement work if the program is phased out in fiscal year 1987?

Answer: In 1985, EPA received applications from 1,107 local education agencies (LEAs) which included about 8,500 abatement projects in 5,000 schools. We funded 417 projects in 340 schools with $45 million. Last year EPA estimated that the 1985 applications contained approximately $200 million worth of abatement work which met the ASHAA criteria for severe asbestos hazards located in financially needy schools. Since the decision to proceed with abatement work depends on many factors unique to each local education agency including the use of private State, or local resources to fund abatement projects it is not possible to estimate how many, if any, schools are unable to perform abatement work.

Question: How many children do you estimate will continue to be exposed to hazardous asbestos if no federal assistance is available in 1987, and their schools lack the resources to pay for abatement on their own?

Answer: It is not possible to estimate the number of children who will be exposed to hazardous asbestos if no federal assistance is available in 1987. In many cases, exposure to serious asbestos hazard is limited to some portion of a school's students or employees.

Question: How many abatement projects were funded in the first round of ASHAA applications last year? How many of these projects have been completed? When do you expect the remainder, if any, to be completed? In cases in which there have been delays, what factors have contributed to this?

Answer: EPA funded 417 abatement projects with the $45 million distributed in June, 1985. To date, about $6.7 million has been used by the schools for abatement work, and another $9 million has been released for use by the schools. Very few projects were completed last summer, even though funds were distributed in accordance with the June 6, 1985 deadline specified in ASHAA. In most cases, schools had not developed specifications or selected contractors until after they learned whether EPA was going to offer financial assistance for their abatement work. EPA expects that most of the work funded in 1985 will be completed during the summer of 1986.

Question: I understand that the applications for ASHAA grants and loans for the funds appropriated for fiscal year 1986 were sent to the school districts last month. What steps have you taken to assure that only schools with a reasonable chance of meeting the eligibility criteria will submit applications? Can you provide for the record the time table for processing this year's applications? When do you expect the work to be done on the projects that receive ASHAA funding this year?

Answer: Mailing of application packages to 45,000 local education agencies was completed by EPA on February 26, 1986. Each application package contains a cover memo (attached) explaining that only schools which have friable asbestos with major damage which is exposed or in an air plenum will be considered for funds, and that public school districts with high per capita income or private schools with a high operating budget per pupil figures will be ruled inelligible.

EPA will award 1986 ASHAA beginning July 31, 1986. Based on last year's experience, we expect that the abatement work funded in July 1986 will be completed either during the 1986 Christmas or in the summer of 1987. (1986 program schedule attached)

QUESTIONS SUBMITTED BY SENATOR BYRD

KANAWHA VALLEY PHASE ONE STUDY

Question: Mr. Thomas, I would again like to thank you for your attention to the needs of the people of West Virginia and especially those in the Kanawha Valley. Your willingness to quickly join me in touring the Union Carbide plant after the accident which injured 135 people last August is but one of many demonstrations of your dedication to your job and commitment to protect the health and safety of all Americans.

The fiscal year 1986 appropriation included my $250,000 amendment to initiate Phase One of the Kanawha Valley Health Effects Study. That "scoping" study is to be performed jointly by EPA, Harvard University, and the National Institute for Chemical Studies.

Would you please give me a status report on the Phase One Study?

Answer: Prior to the FY 1986 appropriation of $250,000, the EPA engaged the Harvard School of Public Health (HSPH) to conduct a feasibility study in the Kanawha Valley. This effort was intended to ascertain if enough scientific information is available in the Valley to conduct a larger-scale study examining an association between air pollution and health. The HSPH report was received on March 19, 1986, and is currently undergoing evaluation by the Agency. The report is expected to serve as a preliminary proposal for development of the Phase One Study. The Agency will continue to work with HSPH and the National Institute for Chemical Studies to develop a comprehensive proposal for the study.

Question: Do you anticipate that the result of the Phase One Study will provide useful information that will lead to the better protection of the people of Kanawha Valley from the possibility of chemical accidents and from day-to-day production activities?

Answer: The Agency has a number of coordinated activities taking place in the Valley to assess the extent of health and environmental effects. In addition to the planned Phase One study, these activities include a cross-media screen of sources and effects under the Agency's Integrated Environmental Management Program, and a monitoring effort to confirm the presence of targeted compounds and provide ambient air supportive data for the screen. The Phase One Study will be useful in presenting a clearer picture of the status of health in the Valley and in ascertaining the degree to which air pollution is a contributor to possible health problems. The entire spectrum of activities in the Kanawha Valley, including those of the EPA and the National Institute for Chemical Studies, will lead to better protection of people in that region. The Phase One Study contributes to that goal.

Question: When do you expect the Phase One Study to be completed?

Answer: It is expected that the Phase One Study will begin later this year and require 12 to 18 months for completion. We will be able to specify the time frame to a greater degree after we have reviewed the Harvard School of Public Health report and developed a detailed proposal for the study.

SUBCOMMITTEE RECESS

Senator GARN. The subcommittee will stand in recess until Wednesday, March 19, at 10 a.m. in SD–124, when it will hear testimony from the Veterans Administration on their fiscal year 1987 budget request. The subcommittee is recessed.

[Whereupon, at 11:40 a.m. Wednesday, March 12, the subcommittee was recessed to reconvene at 10 a.m. Wednesday, March 19.]

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

THURSDAY, MAY 15, 1986

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10:05 a.m. in room SD–138, Dirksen Senate Office Building, Hon. Jake Garn (chairman) presiding.

Present: Senators Garn, Leahy, Proxmire, D'Amato, and Johnston.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

STATEMENT OF JAMES C. FLETCHER, ADMINISTRATOR

ACCOMPANIED BY:
- DR. WILLIAM R. GRAHAM, DEPUTY ADMINISTRATOR
- C. THOMAS NEWMAN, COMPTROLLER
- THOMAS L. MOSER, DEPUTY ASSOCIATE ADMINISTRATOR FOR SPACE FLIGHT

OPENING REMARKS

Senator GARN. The committee will come to order.

It is certainly my pleasure to welcome you, Dr. Fletcher, before the subcommittee this morning. I am obviously very pleased that you have taken over the job as Administrator of NASA. I am also pleased to have Dr. Graham, the Deputy Administrator, here this morning.

As was so perceptively stated by one of my predecessors as chairman of this subcommittee when you were last with NASA, at the time of your leaving the agency, and I quote: "You are one of the best administrators in the Government." That predecessor also happens to be sitting on my left at this point

Dr. FLETCHER. Thank you, Mr. Chairman, and Senator Proxmire.

Senator GARN. Also with us today are Tom Newman and Tom Moser. Both represent a high level of technical competence which has been a hallmark of NASA. I am happy to welcome all of you.

PREPARED STATEMENTS

In the interest of time, I will ask unanimous consent that the remainder of my statement and that of Senator D'Amato be placed in the record as if read.

[The statements follow:]

OPENING STATEMENT OF SENATOR GARN

This Nation has not been confronted with a greater challenge to our confidence of technology leadership since the dawn of the space age and the launch of the Sputnik.

While we marvel at the Soviet Union's efforts to make operational their new space station, MIR, we are confronted with not only the tragedy of the January 28 loss of the *Challenger* and its crew, but the incredible back-to-back failure of two Titan launches and a Delta launch.

It is as if we were back to the late fifties and early sixties when we were almost expecting the next Vanguard or Redstone to explode on the pad.

What has changed is that we have learned so much in the intervening years. That our failures teach lessons that we painfully learn and build upon. That is what enabled us to pursue the Apollo program and put men on the Moon. And that is what will ultimately be the legacy of the *Challenger* tragedy—that we will learn from the sacrifice of these seven brave and wonderful Americans—and that we will fulfill their spirit and dedication, to achieve what they dreamed of and what they gave their lives for.

We sit here, a long distance from where they sat, enclosed in a fragile contraption covered by silicon tiles and racing toward the stars. But we share their dream. We may be hamstrung by budget realities and deficit neutral outlay restraints, but the dream, their dream, is alive.

It is only left to us to carry out the spirit of their challenge, of discovery, of seeking the full potential of what we, as beings, in this universe must achieve.

I have often stated that the issue we now confront is the very future of our space program * * * not whether we have three or four orbiters, or whether we choose to add more expendable launch vehicles to our inventory.

The question is more fundamental. Are we going to move forward or are we not?

To my way of thinking, we have no choice, it is inescapable, we must go on.

Dr. Fletcher, before you proceed, may I only note that we have only a very limited issue before our subcommittee. That is, What additional budget requirements currently confront your agency?

Issues regarding the details of your fiscal year 1987 budget will be discussed in a later hearing when the Administration submits a revised request.

Please proceed.

STATEMENT OF SENATOR D'AMATO

Mr. Chairman, I am pleased to join you for this hearing on the NASA anomaly resolution and orbiter production readiness.

First, I would like to mention how glad I am that we have Dr. James C. Fletcher back as the Administrator of NASA. His expertise as a former NASA Administrator and outstanding qualifications in the sciences will greatly benefit further developments and plans in the space sciences.

Mr. Chairman, as you know, NASA must be able to maintain readiness and production capability for a replacement orbiter contingent upon the Presidential Commission on the *Challenger's* ultimate recommendation. In order to do this, there are a variety of activities that must continue and others that might need to be initiated. Some of the actions that we need to seriously consider include progress toward restoration of a three-shuttle orbiter program and the cost-effective and timely replacement of the *Challenger* when that decision is made by Cogress.

Supplemental funding would be appropriate for space flight control and data communications for costs associated with restoring to flight status the shuttle transportation system and to maintain the production capability for a replacement orbiter. It is of vital importance that NASA restore the space transportation system to flight status. To do otherwise would prove too costly to the Government.

Mr. Chairman, our continuing commitment to the space program will enhance America's strength and prosperity. The space transportation system must stand ready for future developments that the Congress may wish to undertake.

Thank you, Mr. Chairman.

SENATOR PROXMIRE'S PAST COMMENTS ON SHUTTLE

Senator GARN. Senator Proxmire.

Senator PROXMIRE. Thank you, Mr. Chairman.

Mr. Chairman, I am kind of glad that you made that reference to my statement before. I have great admiration and respect for Dr. Fletcher. I do think that he managed to pull the wool over my eyes. Never again.

While quoting statements made years ago, I would like to read you a few excerpts from an article I wrote when the space shuttle was first launched April 10, 1981, which may have withstood the test of time a bit better.

I said then, and I quote: "When NASA appears before the Senate Appropriations Committee it will have to explain why our decision to put all of our eggs in the shuttle basket has ground the rest of our space program to a virtual halt."

I also said, "The shuttle will not be as cost effective as expendable launched vehicles for many, many years."

I further said, "There are increasing indications that the shuttle's primary use will be as a tool in our military arsenal and that the civilian space establishment will take a back seat."

So I wasn't always wrong.

Thank you, Mr. Chairman.

Senator GARN. Well, I wouldn't intend to start a debate here. There would be some disagreement, Senator. As much as I admire you, and we work together on two different committees, I think we could spend considerable time and, at some point, we probably will debate the merits of the shuttle and its capabilities versus ELV's and the proper mix between those; also the ability of people to make predictions on cost estimates 15 years in advance on a research and development project that has not flown.

Dr. Fletcher, this is a limited-purpose hearing this morning.

Dr. FLETCHER. Yes.

RECOVERING FROM "CHALLENGER" ACCIDENT

Senator GARN. We simply wanted to take a look at a narrow focus at this point. Obviously we will have you back in the future to discuss future requests from the Administration. We are not considering fourth orbiter replacement here this morning or the general NASA budget request for 1987.

Our concern is in looking at the aftermath of costs that have been imposed as a result of the *Challenger* tragedy and considering what we must do just to replace some of those additional burdens that have been placed as a result of the anomaly of changes and repairs and fixes that we must make in the immediate future during this fiscal year.

We are very happy to have you with us. If you have any opening statement that you wish to make, please proceed, Dr. Fletcher.

INTRODUCTION OF ASSOCIATES

Dr. FLETCHER. Mr. Chairman, before I begin, I would like to introduce the people that are at the table with me.

Senator GARN. Yes.

Dr. FLETCHER. Of course, you know Tommy Newman, who is our Comptroller.

Senator GARN. Yes.

Dr. FLETCHER. You know Bill Graham, our Deputy Administrator. Here, maybe for the first time, is Tom Moser, who is now sitting in for Admiral Truly, who, as you can understand, is having hearings other places.

PREPARED STATEMENT

Mr. Chairman, I would like to submit a short statement for the record.

Senator GARN. Yes.

Dr. FLETCHER. I would like to submit it with your permission and then simply highlight some of the items in that statement.

Senator GARN. We would be happy to include it in the record.

Dr. FLETCHER. Thank you.

Senator GARN. Without objection, your full statement will be included in the record at this point.

Dr. FLETCHER. Thank you.

[The statement follows:]

STATEMENT OF DR. JAMES C. FLETCHER

Mr. Chairman and distinguished members of the subcommittee, It is good to be back once again representing NASA as the Administrator and I appreciate the support and encouraging words which I have received from you, Mr. Chairman, and other members of the subcommittee as I undertake this assignment. As you are well aware, these are difficult times for NASA as we recover from the shuttle *Challenger* accident in an environment of intense, critical scrutiny and we need your moral as well as financial support.

This brings me to the purpose of this hearing, which is to discuss the impacts of the shuttle accident on the NASA program and what is needed to restore the space transportation system to flight status and to maintain the production capability for a replacement orbiter.

First let me turn to the impact of the *Challenger* accident on our funding plans for fiscal years 1986 and 1987. In brief, these impacts include:

- Reduction in near-term funding requirements for planned flight activities, for payload and mission preparation, and related supporting activities. The net reduction in NASA funding for shuttle operations reflects savings in operational costs partially offset by loss of expected reimbursements from foreign and commercial users of the shuttle
- Redirection of some effort previously planned for operation of major missions such as Space Telescope and Galileo into sustaining activities in preparation for revised mission activities when shuttle flight operations are resumed.
- Procurement of a tracking and data relay satellite [TDRS] spacecraft to replace the TDRS which was destroyed.
- Continued operation of tracking ground stations which had been planned for closing.
- Delayed the planned main propulsion system ground test pending further examination of the technical issues involved in that testing.

- Accident investigation requirements, including salvage operations.
- Undertake corrective actions, identified by the Rogers Commission and our own investigations, such as on the solid rocket boosters. The solid rocket motor field joints will need to be redesigned, hardware modifications made, and testing of the modified motors conducted.

The loss of *Challenger* reduced the compatibility with the Centaur upper stage to one orbiter. We have begun action to procure the equipment necessary to make the orbiter *Discovery* compatible with the Centaur upper stage to replace this lost capability. We are also continuing the development, testing, and engineering support activities on the Centaur upper stage. As part of these activities, we are conducting a thorough safety review to ensure that the Centaur will operate properly and safely in the shuttle.

The fiscal year 1986 operating plan for the original appropriation level totaled $7.656 billion. Under the Deficit Control Act sequestration process we have taken a reduction of $323 million for a revised fiscal year 1986 plan of $7.333 billion.

We have sent you a revised operating plan for fiscal year 1986. In that plan, we identified $147 million in offsets primarily from reduced operations costs which have been applied against increased funding requirements for science and applications programs, tracking, and data and lost reimbursements. We have also requested that the Congress approve the appropriation transfer authority required to implement the changes brought about by the Deficit Control Act and the *Challenger* accident

In fiscal year 1987 we have tentatively identified approximately $500 million of offsets to cover extension of development and ground activity for a number of spacecraft projects, loss of shuttle reimbursements, initial funding for replacement of the tracking and data relay satellite lost in the accident, continued operation of the tracking ground stations, and the cost of sustaining the necessary contractor teams on affected projects. We also expect a net resulting savings available for the additional requirements in the space transportation area. At this time, these adjustments do not provide for major hardware changes which may be determined to be necessary from the Rogers Commission and our own investigations. Based upon anticipated recommendations from the Rogers Commission and our best assessment of the time needed to make the modifications to the solid rocket booster motors and other hardware or procedures changes, the next shuttle flight is planned for the summer of 1987.

Mr. Chairman, as you know, there is an ongoing interagency process to examine options and issues relating to the *Challenger* accident and how best to fund and implement the changes necessary. I am confident that we will determine and correct the causes of the *Challenger* accident and the shuttle will emerge as a stronger, safer system capable of meeting space launch needs for years to come. The introspection that NASA is undergoing as a result of this accident investigation will make NASA a stronger agency committed to innovation and technical excellence that will retain American preeminence in space into the next century. Space has been, and with the shuttle, our science activities, and the space station, it will continue to be, an American frontier.

Mr. Chairman, this completes my prepared statement. I would be pleased to respond to questions you and other members of the subcommittee may have.

OPENING REMARKS OF DR. FLETCHER

Dr. FLETCHER. Now, it is good to be back with this committee representing NASA as its Administrator. I do also appreciate the kind words that you and, in the past, that Senator Proxmire have made, even though his judgment may have been wrong then. I really appreciate over the years the support this committee has given when I was not here. We can't do anything at NASA without your support.

The purpose of the hearing, as I understand it, is to discuss the impact of the shuttle accident on the NASA program or what might be needed to restore the space transportation system to flight status and to maintain the production capability for a replacement orbiter.

REDUCTION IN NEAR-TERM FUNDING

We have a rough cut that we will present to you. But, in brief, it goes something like this. We will need to reduce in the near term the funding requirements that were planned for an ongoing flight program because there obviously will be payloads and missions that won't be flown. The preparations for these will represent a reduction in near-term funding.

There will also be a redirection of some of the effort on the various programs planned to go on the shuttle. There are such things as the Space Telescope and Galileo, which have to be redirected to accommodate the down time which, as you know, is estimated at this time to be July, to fly again in July 1987.

PROBLEM OF COMPATIBILITY

The loss of the *Challenger* did reduce the compatability of the space shuttle fleet with the Centaur upper stage to one orbiter. We have got to deal with the problem of procuring the equipment which is necessary to make that orbiter *Discovery* compatible with the Centaur upper stage to replace this lost capability. That is one of a large number of things that we have to do with the Centaur. I only mentioned the Centaur here because that is one of the long poles in the tent, as we say, in getting back on track. We do have to do that carefully. It is one of the most difficult operations ahead of us in getting back on track.

We do have, and you already know about the deficit reduction cut that we made, the $300 million. We have sent you a revised operating plan for fiscal year 1986. We have identified other offsets which can be made as a result of the accident which Mr. Newman will discuss, presumably under or at your questioning.

PROCESS OF RECOVERY FROM ACCIDENT

Let me deal with the primary issue. We do not have in front of you or before you a supplemental which causes us to recover, or to allow us to recover, from the accident. As you know, there is a process, Mr. Chairman.

As you know, there is a White House process that is going on to examine the various options and issues which relate to the *Challenger* accident. What is the best way to fund it and what kinds of programs will have to be rearranged in order to allow for this supplemental to go ahead? I am hopeful that will be before you shortly. We are not ready today with that supplemental.

In conclusion, I am confident that we will be able to determine and correct the causes of the *Challenger* accident and the shuttle will emerge as a stronger, safer system that is capable of meeting the space launch needs for many years to come.

The introspection that NASA is undergoing, and we are going through the whole NASA program, not just the shuttle, as a result of this accident investigation, this will make NASA a stronger agency committed to innovation and technical excellence that will retain American preeminence in space into the next century.

Mr. Chairman, that completes my informal remarks. I am ready for questions.

Senator GARN. Thank you, Dr. Fletcher.

Mr. Leahy, our ranking minority member, has arrived.

Do you have any opening statements that you wish to make before I go to questioning?

Senator LEAHY. Thank you, Mr. Chairman.

Senator GARN. Senator Leahy.

STATEMENT BY SENATOR LEAHY

Senator LEAHY. Mr. Chairman, I would like to thank you for the commitment that a decision on a replacement shuttle will not be made until the Rogers Commission reports and until we have hearings. I have stated a number of times that the United States will always, of course, be in a space program. The United States will always have a manned space program. In both instances we push the limits of technology. We pursue our own destiny as a nation in doing that.

VALUE OF SHUTTLE QUESTIONED

I am not convinced at all that we should build another shuttle. I certainly am not convinced, nor would I ever be convinced, that the shuttle would be an economically viable vehicle. I doubt it was ever intended as that, notwithstanding NASA's public statments to that effect.

Now, I think in that regard all of us, whether in Congress or NASA or the various administrations, the public and even the press, allowed public relations to carry the day and ignored the facts. That doesn't mean that the shuttle wasn't a good idea.

Certainly, it pushed our technology and it showed what we could do as a nation. I think now that the determination of whether we will have a shuttle or not will be based on whether it makes sense from both a scientific and a military point of view. If we get some benefit from it economically and some commercial applications, that is an extra. We should be happy to have it.

I think NASA, the Congress and everybody else, if they would be more honest about it, would agree that as a commercial instrument it is really an Edsel. As a scientific or a military tool, something to show how far we can push technology in this country, there, it may well be a brilliant idea. We will determine that.

SPACE STATION

We also will now find, and I suspect, although it is not the purpose of this hearing, but I suspect the question of the space station will now be looked at from a different view than had been before. It is not just a question of is this the most spectacular thing to do. The Soviets are doing one. Should we do one, too, because of that? Rather, we must determine what our real reason for building a space station is.

There will be, of course, a tremendous public relations drive that we must have a space station. I think that every one of you want more than that. I am not suggesting at all that is the only reason we want one.

I think that now we will have a real debate in the Congress on whether we are going to have a space station, why it is going to be there, and what we get out of this.

Again, we will be well aware that there may be some commercial applications that are available. But those are an extra.

We will decide on our shuttle and space station on the basis of whether it makes sense scientifically and militarily for our country. I am not saying it won't. It may very well make eminent good sense.

In conclusion, Mr. Chairman, I might say that I have no doubt that the United States, which has really become the leader in the space program, will continue to be the leader in the space program. I have no doubt that we will continue to be in the manned space program.

DEBT OWED TO PROGRAM PERSONNEL

We have attracted the absolute best of men and women in our country into our astronaut program. I have been privileged to know a number of them. In fact, there was one who was in Vermont with me just last week, Col. Jerry Ross. I have been extremely impressed with every single one of them.

I think that we owe a duty as Members of Congress to them. You owe a duty as the Administrator of NASA to them. Every one of these brave men and women are willing to put their lives on the line. They obviously give their absolute best physically and mentally to this program and we assume that everybody else has done their job up and down the line.

I think that this is obviously going to be your duty. I don't think, Dr. Fletcher, you would have accepted reappointment if you didn't feel that you could carry forward with that duty to make sure that everything has been done, to the absolute best standard, before we ask these brave men and women to go into space again.

As I say, I am committed to a manned space program for the country. I am committed to the continuation of the space program in this country. But I am also committed that we state very clearly and honestly exactly what it is that we are getting out of it. If it is going to be extremely expensive to do it, then we say that it is going to be extremely expensive. Here is the cost. Then we make our decisions right up front.

Thank you, Mr. Chairman.

Senator GARN. Thank you.

Senator Johnston, please go ahead.

REMARKS BY SENATOR JOHNSTON

Senator JOHNSTON. Mr. Chairman, I have no comments except to say that or to welcome Dr. Fletcher and to tell him that I'm a strong supporter of this space program. I have confidence that he'll get it back on track. I am also a strong supporter of the space station. I will have some questions about that later.

Thank you, Mr. Chairman.

RESTORATION OF ORBITER FLEET

Senator GARN. Dr. Fletcher, as I said to begin with, our consideration today is not a replacement for a fourth orbiter.

I have been disturbed that the administration has not been able to come up with a recommendation. I hope that recommendation will be forthcoming soon.

Our immediate concern is the requirement of NASA to restore the remaining orbiter fleet to service. We do have three. The question is how do we get those three back into service and how much is this going to cost.

Dr. FLETCHER. Yes.

Senator GARN. This is regardless of what decision that we make on a fourth orbiter, which I think is absolutely necessary that we must have if we are to have a viable space station. Now, a month ago we did hold hearings on access to space where I think it was made very clear how critical the shuttle system is in meeting national security requirements, as well as civilian space activities. When I talk about commercial enterprises I don't disagree with what Senator Leahy has said as far as the delivery of commercial satellites to space. I can justify the orbiter on the basis of science and the incredible number of spinoffs that we haven't heard too much of lately, the products that we, as civilians, and those in commercial enterprise use in terms of the thousands that are not measured in these cost-benefit analyses.

I will continue to try to make certain that people are aware of that commercial side of space, both from the ELV's and also those derivations of the space program that all of us, every human being on the face of the Earth, use and enjoy every day. Basically, that story will get out.

RECOVERY PROGRAM

In the meantime, we do need to take a look at what is also necessary to get three, the three orbiters, back in space.

You have furnished the subcommittee staff a list of items in the recovery programs.

Dr. FLETCHER. Yes.

[CLERK'S NOTE: The two following charts were provided by NASA:]

FY 1986 OPERATING PLAN REVISION
Millions of Dollars

	FY 1986 BUDGET	CONG REDUCTIONS	GRAMM-RUDMAN-HOLLINGS	ACCIDENT OFFSETS	TOTAL REDUCTIONS	PARTIAL RECOVERY ACTIONS	CURRENT OPERATING PLAN
SPACE STATION	230	-25	-10	--	-35	--	195
SPACE SCIENCE AND APPLICATIONS	1613	-65	-76	-23	-164	27	1476
SHUTTLE/SPACELAB PAYLOADS	220	-27	-14	-9	-50	--	170
GALILEO	40	14	--	--	14	10	64
ULYSSES	6	0	--	--	0	3	9
MISSION OPS & DATA	215	-14	-9	-14	-37	--	178
MAGELLAN	109	-3	-2	--	-5	14	118
UPPER ATMOSPHERE RESEARCH SATELLITE	134	-10	-10	--	-20	--	114
MARS OBSERVER	44	-6	-4	--	-10	--	34
SCATTEROMETER	32	-18	--	--	-18	--	14
ADVANCED COMMUNICATIONS TECH SAT	90	-5	-3	--	-8	--	82
GAMMA RAY OBSERVATORY	87	--	-2	--	-2	--	85
OTHER PROJECTS	636	4	-32	--	-28	--	608
AERONAUTICS	354	0	-16	--	-16	--	338
SPACE R&T	168	0	-9	--	-9	--	159
COMMERCIAL PROGRAMS	41	-13	-1	--	-14	--	27
TRACKING AND DATA	825	-107	-34	-15	-156	7	676

FY 1986 OPERATING PLAN REVISION
Millions of Dollars

	FY 1986 BUDGET	CONG REDUCTIONS	GRAMM-RUDMAN-HOLLINGS	ACCIDENT OFFSETS	TOTAL REDUCTIONS	PARTIAL RECOVERY ACTIONS	CURRENT OPERATING PLAN
SPACE TRANSPORTATION	3161	-27	-150	-109	-286	57	2932
SHUTTLE OPERATIONS	1725	0	-40	-87	-127	42	1640
SPACE SHUTTLE PRODUCTION AND CAPABILITY DEVELOPMENT	977	-5	-84	--	-89	--	888
UPPER STAGES	122	0	-9	--	-9	15	128
OTHER STS CAPABILITY DEVELOPMENT	337	-22	-17	-22	-61		276
TOTAL R&D/SFCDC	6392	-237	-296	-147	-680	91	5803
RESEARCH AND PROGRAM MGMT	1387	-25	-21	--	-46	--	1341
CONSTRUCTION OF FACILITIES	149	-10	-6	--	-16	--	133
TOTAL	7928	-272	-323	-147	-742	91	7277
AVAILABLE FOR: SALVAGE AND FAILURE INVESTIGATION RELATED COST IMPACTS CORRECTIVE ACTIONS						56	56
TOTAL						147	7333

ANOMALY RESOLUTION/CORRECTIVE ITEMS

FAILURE INVESTIGATIONS INCLUDING SEARCH AND SALVAGE OPERATIONS	43.0
o SALVAGE OPERATIONS	15.0
o INVESTIGATION AND TESTING	
- SUPPORT TO ROGERS COMMISSION	1.5
- ENGINEERING AND ENGINEERING SUPPORT TO JSC	16.0
- TEST AND ANALYSIS ON SRB	6.0
TEST AND ANALYSIS ON EXTERNAL TANK	3.0
- LAUNCH DATA AND RELATED ANALYSIS	1.5
RELATED COST IMPACTS	46.0
- CONTINUATION OF ONGOING STRUCTURAL SPARES	28.0
- MAIN PROPULSION TEST DELAY	13.0
- EQUIPMENT KIT FOR MODIFICATION OF ORBITER FOR CENTAUR	5.0
CORRECTIVE ACTIONS	537.0
o SRM REDESIGN, FABRICATION, TESTING	250.0
o SRB REUSABILITY RECERTIFICATION AND INCREASED FLIGHT INSTRUMENTATION	12.0
o CRITICAL ITEM LIST CORRECTIONS	
- SSME MAIN COMBUSTION CHAMBER OUTLET MODIFICATION AND PLATING (ALL ENGINES)	50.0
- SSME TURBO PUMP BLADE REDESIGN AND MODIFICATION, POWER HEAD RESONANCE MODIFICATIONS, ADDED CERTIFICATION TESTING	75.0
- BOOSTER ASSEMBLY CONTRACTOR RECERTIFICATION	15.0
- ORBITER CRITICAL ITEMS NOSE-WHEEL STEERING - PHASE III CARBON STRUCTURAL BRAKES ENGINE SHUTDOWN RCS INSTABILITY CONTROL FUEL CELL SAFETY MODS MULTIPLEX-DEMULTIPLEX REDUNDANCY APU SAFETY MODS EMERGENCY LANDING SYSTEM MODS	85.0
o CONTINGENCY	50.0
TOTAL ALL ITEMS	626.0

Senator GARN. Could you please go over those items for the subcommittee?

Dr. FLETCHER. Do you want us to then go ahead and respond with this?

Senator GARN. Yes; if you could please go over those for the subcommittee's benefit any items that you need in the recovery program.

Dr. FLETCHER. Mr. Newman.

INCURRED COSTS

Mr. NEWMAN. Well, we have been incurring costs. To date we have incurred about $40 million in costs. We have been covering those with funds available. About $15 million of that was for the salvage operations. This was basically off the coast of Florida. We have incurred costs to support the Rogers Commission. We have maintained engineering capabilities with the Rockwell contractor because they have the systems engineering contract. We have run tests of the solid rocket booster joints. We have done an analysis on the potential solutions to the problem. We have also worked on an analysis of the external tank and launch system.

If you take all of those costs together, including the cost of the salvage operation, I estimate that we will spend about $43 million for those activities.

We have extended the structural spaces activities in preparation for a potential build of the new orbiter. We had planned to cut that activity back somewhat under Gramm-Rudman reductions, but we have extended that activity at a cost of about $28 million through rest of this fiscal year.

Now, we have delayed the main propulsion system test that would have been conducted in February. The delay of that and in keeping the crews available to conduct that test, if extended, if we extend that into fiscal 1987, this will cost us about $13 million.

We have undertaken to provide a kit with equipment to modify another orbiter and have the capability of carrying the Centaur and for the hardware in that kit there are obligated funds that would total about $5 million.

The total of those activities is about $46 million, Mr. Chairman.

Senator GARN. If I could stop you at that point.

Mr. NEWMAN. Yes.

Senator GARN. If I could stop you so that the subcommittee understands that $5 million for modification of the orbiter for the Centaur was modified already, as I understand it. The loss of the *Challenger* is the reason it necessitates modifying then another orbiter to be able to deploy the Centaur.

Mr. NEWMAN. That is correct, sir. We would then have the equipment for two orbiters to be capable of carrying the Centaur.

CORRECTIVE ACTIONS

Now the other areas are less certain in the estimates because much of the activity has yet to be determined. The biggest single item remains on the corrective action that we need to take will no doubt be on the SRB. We are estimating that it will cost about $250 million for that activity. We will need some requalification testing, some recertification. We will provide for increased flight instrumentation on future SRB launches. We are estimating about $12 million for those activities.

You have probably heard of the critical items list, which is a long series of items which have been under consideration as potentially needing correction. Many of them we have been able to operate with.

Among the things that we have convinced ourselves that we will change are the nickel plating of the outlet of the turbine, of the turbo pump on the oxygen side. That will run for all the engines involved in the combustion chamber plating and modification. They will run about $50 million.

We do have a problem with the turbo pump blade and with a resonance problem in the main engine turbo pump. There will be work to modify that and to conduct certification testing. We are estimating about $75 million for that activity, which is including modification of the engines.

We will need to recertify the activities of the booster assembly contractor. That is the contractor that reprocesses the boosters after launch. We are estimating about $15 million for that, in that area.

These are a series of items that deal with the orbiter, such as the nose wheel steering, the brakes, the engine shutdown sequence, and to modify the control of that; reaction control systems and some modification as to the fuel cells to make them more safe; auxiliary power unit which still requires some modification. We want to work on the landing system.

When you combine all of those we are estimating about $85 million for those. This totals just under $500 million when you combine those. We think it is reasonable to provide a contingency of about $50 million. When you combine everything that I have said it adds up to about $626 million primarily in fiscal 1986–87. Some of it is going into fiscal 1988.

Senator GARN. Thank you.

Dr. FLETCHER. Mr. Chairman.

Senator GARN. Dr. Fletcher.

Dr. FLETCHER. Mr. Chairman, I think that the list that Mr. Newman has recounted is, of course, a tentative list. That's why we have a sizable contingency.

I'm sure that Mr. Moser can elaborate on some of the other things they are considering doing. We want to do as much as we can to make this thing absolutely safe when we fly again. I just want to make sure that this list is considered as a tentative list. It is at least this much that we will be doing.

Mr. Moser, do you want to add anything?

SAFETY MARGINS

Mr. MOSER. Yes; thank you, Dr. Fletcher.

Senator GARN. Mr. Moser.

Mr. MOSER. Senator Garn, the list that you see here is the result of beginning to get into the investigation and our own assessment of those items which have adequate margin—that is, had adequate margin when we were flying last—and we are looking at what we might do to further increase the safety margin of the things that you see listed here.

For instance, with nose wheel steering we did not have a fail-safe operational system since that was not considered to be used as a primary landing mode system. But in light of brake, or the problems we had to rely on the nose wheel steering——

Senator GARN. I know about your brake problems.

Mr. MOSER. I know you do.

This relieves the total effort that has to be expended for the brakes. This is a way to increase the safety margin to each one of these things that Tom Newman touched on, this is what we see as a system that has a potential margin increase.

I think that this is the right way to look at it.

I would be happy to discuss any one of these with you that you would care to discuss.

Senator GARN. I would only say for my committee members' benefit that the reason that I am knowledgeable about the brake failure is that an orbiter has not landed at Kennedy since my flight. We did have our right main brake fail on my landing. It blew the tires. I can certify that you do have a problem with the brake. You do need to have a fix there. This is totally unrelated to the *Challenger* accident.

Let me just state that I appreciate your giving us this list. We recognize that some of these are uncertain, that you will have to more fully develop what the needs are after the Rogers Commission report.

What we will be requesting in the urgent supplemental this afternoon in the markup is $100 million less than the total on the basis that we think that is reasonable at this time with some of the uncertainties and we expect that there will be more and that all of these costs will not fall during the 1986 budget period. We have reduced what your list is here, $526 million.

OVERVIEW OF THE FISCAL YEAR 1986 NASA BUDGET

If you could, Mr. Newman, just quickly walk us through a general overview of the budget process that we went through last year. There is a lot of opinion going on in certain quarters that NASA is awash with money. We started with a $7.9 billion request last year. If you could walk us through that budget process from the original administration request of $7.9 billion, what was passed in the regular appropriations bill, the effect of Gramm-Rudman, and where your operating budget currently stands now.

Mr. NEWMAN. Yes, sir; we requested, as you said, sir, $7.928 million for fiscal year 1986. The congressional action in the initial appropriation cut that figure by $272 million and with cuts in a large number of areas. I believe congressional action was getting that budget down in view of expected action on the deficit reduction activities.

In January, under the provisions of the Gramm-Rudman-Hollings Act, we were required to take another $323 million from the amount appropriated by Congress. With that reduction we had to delay a number of things. We had to cut into some of the testing we had planned. We lost a great deal of remaining flexibility in our flight program. We, in fact, went into a hiring freeze in anticipation of that activity. So after the Gramm-Rudman reductions we were down from $7.656 to $7.333 billion. That is where we were at the time of the accident.

When the accident occurred we looked at all of the areas that we thought we could take money out of as a result of the events, and make money available to begin the work that we knew that we would have to do and the types of things that were just mentioned.

We identified about $147 million in reductions in that area, including delay of work on things like spacelab payloads, delay in operations, delay in preparation of tracking stations, tracking systems, for future missions. There was a delay for the phasing of production of tanks and SRB's and other items for the shuttle. Also payload support activities, Spacelab operational activities.

When we had done all that we cut another $147 million out of the budget, out of the planned funding I should say. So the total reduction from the original request was from $742 million.

Now there were a number of things that we had to cover against, including the projected loss of reimbursement for the shuttle missions that would not be flown for commercial customers and the extension of the period for which we would have to support some of the science projects that would have been launched in the last part of 1986.

When we net all of that out we are able to make in fiscal 1986 about $56 million of funds available to apply against the salvage and the other activities we had undertaken as a result of the accident.

So present availability is $7.333 billion.

Senator GARN. So even if the Congress approves the request that I will make today of $526 million, including all the costs that were necessary to absorb, and that were certainly unanticipated in the 1986 budget due to the accident, we will still be less than the administration's request to the Congress?

Mr. NEWMAN. That's right; it is by almost $50 million, sir.

Senator GARN. Thank you.

Mr. NEWMAN. Yes, sir.

STATUS OF ORBITER PRODUCTION CAPABILITY

Senator GARN. Dr. Fletcher, can you outline, or can one of your staff outline, the current status of the orbiter production capability?

Dr. FLETCHER. I'm going to turn to Mr. Moser in a minute, Mr. Chairman.

Senator GARN. Yes.

Dr. FLETCHER. The orbiter production capability that you are referring to, I suspect has to do with the replacement for the *Challenger*. We have not as yet come forth with a request for that orbiter, but I can personally state that it is absolutely necessary for the pursuit of our objectives in space. It is not just the space station, but overall in moving out into space. I hope that doesn't impact too hard on Senator Leahy's comments. But I really personally feel that the fourth orbiter is absolutely necessary. That next orbiter is absolutely necessary, but we haven't come forth with the request yet.

So assuming that your question does have to do with the production capabilities on that fourth orbiter, I would like to turn to Dr. Graham or Mr. Moser.

Senator GARN. Well, it does, indirectly, at this point. There is no doubt that we are still awaiting an administration recommendation.

It is my understanding that some of the production lines that are necessary to build an orbiter, that those contracts are now in the process of being terminated or are approaching that point.

Essentially, I'm asking the question of the danger in the short run, say, if the administration and Congress is without a decision soon, then where are we versus those assembly lines?

Now I've been through this with many other items over the years. We close down a production line and we then decide to reopen it. The costs are a great deal more rather than keeping them warm until that decision is made. If the decision is made quickly enough we are not into that. Now I am just trying to anticipate and not have some unnecessary cost overruns if we have some delay. I don't want to find out that it is costing us more to restart them than to have continued them in a warm status, Dr. Fletcher.

Dr. FLETCHER. Mr. Moser.

STRUCTURAL SPARES

Senator GARN. Go ahead, Mr. Moser.

Mr. MOSER. Mr. Chairman, our production capability is on a reduction curve, as you indicated, Senator Garn, and in line with the program plan.

We are reaching very quickly a very critical point in which we would terminate lines. Right now we are working on the structural spares on the west coast. We have other work that is going on in support of spares and logistics. This has, to date, maintained most of the critical skills that we need if we were to build a replacement orbiter. However, those activities are very near completion, both in the functional components and the structural spares. We can provide to you for the record exactly where we are on that curve as we are coming down there.

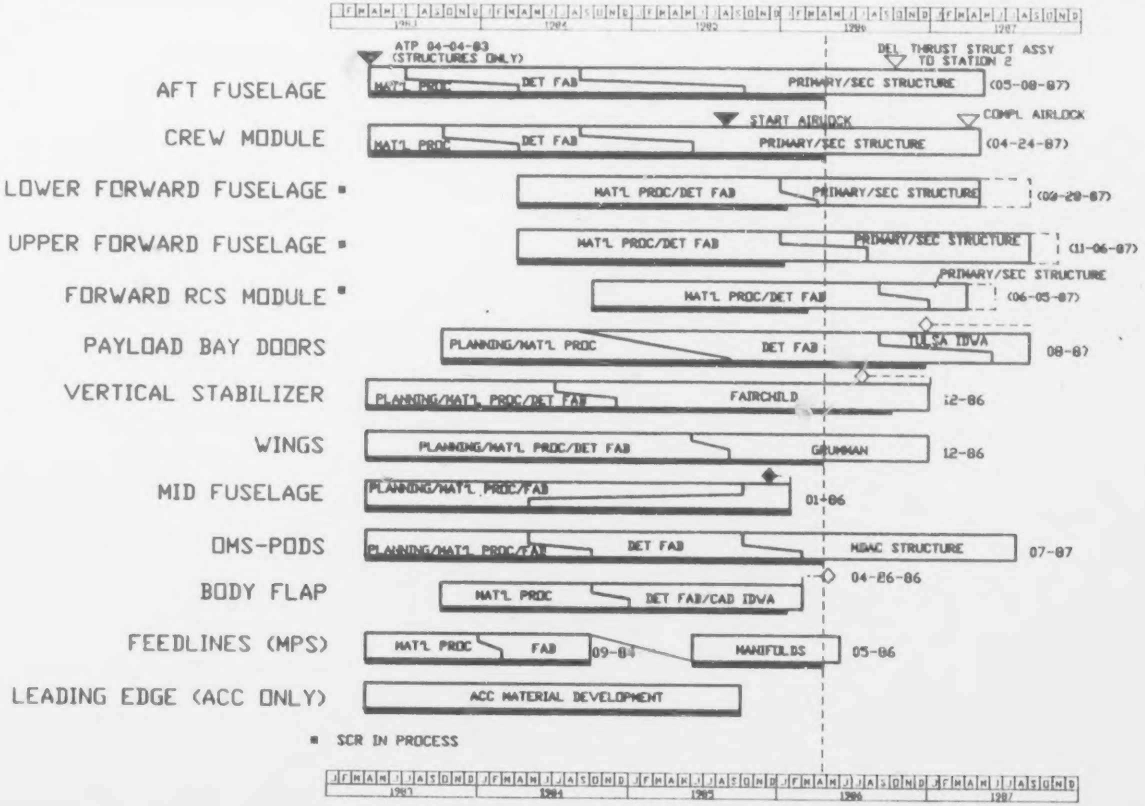
Senator GARN. I would appreciate it.

[The information follows:]

The critical production lines required to support building additional orbiters are the Rockwell final assembly line at Palmdale and the major structural component assembly lines. The Palmdale facility has been mothballed with most essential tooling and equipment in place. Reopening this facility to produce an additional orbiter would be relatively easy. The major structural component assembly lines are in the process of being shut down as structural spares are delivered. The attached structural spares delivery schedule provides these delivery dates. In order to replace the structural spares, which will be used to build a replacement orbiter, we need to act soon to avoid line shutdowns and associated restarts.

Production capability for the other components required to build an additional orbiter (i.e., avionics black boxes, OMS engines, thrusters, valves, actuators, TPS, etc.) is being basically maintained by the continuing logistics program. In some instances where the actual production line may be shut down, the basic capability is being maintained through piece part production, repairs, and sustaining engineering. This capability will erode in the future as all required spares are procured and the repair function is moved to a centralized location.

STRUCTURAL SPARES MASTER SCHEDULE



STRUCTURAL SPARES PROGRAM

Dr. GRAHAM. In addition, Senator Garn, the Structural Spares Program, that has been funded to date to provide major structural elements for the shuttle system, would be used in the event that a replacement orbiter was provided for. This program has taken approximately 2 years off the time that it would require us to invest, to get to a replacement orbiter. In other words, we now look to a replacement orbiter being produced in approximately 3 to 3½ years after authority to proceed. The Structural Spares Program has made it possible to have such a short period of time. Had there not been that Structural Spares Program, we would be looking at something on the order of 5 to 5½ years, Mr. Chairman, from authority to proceed to produce a replacement of the orbiter. That is not to take it to flight. That's to roll out. We then estimate another 6 to 9 months to the first flight.

Senator GARN. Senator Leahy.

FUNDS FOR A REPLACEMENT ORBITER

Senator LEAHY. If we appropriate these funds, the $526 million, are we locking ourselves into a decision on a replacement orbiter by doing that?

Dr. FLETCHER. Senator Leahy, I have been assured that is not the case. The replacement orbiter hasn't been decided as yet by the administration. We wouldn't be suggesting this amount of money if we thought that it interacted with the need for the fourth orbiter or the replacement orbiter.

I don't know whether you want elaboration on that now by Mr. Newman.

Senator LEAHY. No; I will just take your assurance that this is not a camel's nose.

Dr. FLETCHER. Absolutely not, Senator Leahy.

Senator LEAHY. We should make a decision, a clearcut decision, one way or the other, either to have another orbiter or not to have another orbiter. This is one that should be debated. Before very long I would like to see the decision made. I suspect the people at NASA would, too.

Dr. FLETCHER. Yes.

Mr. Newman will comment.

Senator GARN. Mr. Newman.

Mr. NEWMAN. Senator, I think that everything on the list that I read you would agree would have to be done whether we buy a fifth orbiter or not. We need all of that to operate the shuttle, to have the shuttle in an operational condition regardless of the number of orbiters.

FUNDS FOR AN ESCAPE CAPSULE

Senator LEAHY. Would any of the work that is done on the list that you gave us, would that influence or determine any of the design of a possible future orbiter?

For example, there has been a suggestion made that a replacement orbiter should include an escape capsule. Will any of the funds going into the repair work or anything else that you are requesting here prejudice that question which I understand is still at least an open question?

Mr. NEWMAN. That is still an open question.

Senator LEAHY. Am I correct in assuming that?

Mr. NEWMAN. No; it would not prejudice it.

Senator LEAHY. Am I correct in assuming that is at least an open question at this point if there are future orbiters whether they would have an escape capsule or not?

Dr. FLETCHER. Now, Senator, that is still an open question. It is a very difficult question, however. There are a lot of pros and cons in the agency, some of which I personally have gone over with Mr. Moser and Admiral Truly. It may be that they have made up their minds as to which way that they want to go.

I want to refer to your original question. None of the funds we asked for have anything to do with that particular question on the replacement orbiter.

Do you want to answer that, Tom?

Senator LEAHY. Again, just for clarification, I am not saying whether there should or should not be an escape capsule. I do not know whether it makes sense in the design. I am not sure whether an escape capsule is feasible from even an engineering point of view or any other type of view. I just want to be sure that if we are going to be determining any of these questions by this appropriation, that I want to make sure that we delve into it in far greater detail.

Dr. FLETCHER. That will be a separate issue, Senator Leahy, which we will discuss with you at the appropriate time, sir.

Senator GARN. If I could just further answer the Senator's question, I will guarantee you there is not, because my personal opinion has already been made. I am not in favor of an escape capsule, with the expenditure and weight and all that goes with it, because of the little utility that I think you would get from it. So I can guarantee you they are not sneaking money through on me on an escape capsule.

Senator LEAHY. The thing is, though, Jake, that money has gone by with all of us on issues of whether we are fully aware or not, and NASA is going to have to make that decision whether to recommend one or not. I just don't want to be precluding their decision. I suspect also that one would not be feasible, notwithstanding the terrible tragedy of *Challenger*. I want to make sure that determination and that advice is coming to us in an objective fashion and not predetermined by any of us.

Dr. FLETCHER. Mr. Moser.

Mr. MOSER. The things that Tom Newman delineated here do not include funds associated with a replacement orbiter. We are looking at all systems throughout the total shuttle here. We are looking at the orbiter, SRB's, external tanks, et cetera, as to what we might do to increase the total systems margin. This list does not include an escape system. We are looking at an escape system if that does increase, in fact, the total system capability and total system safety.

On the other hand, quite often when those types of systems are added, total system safety is not increased. It is just another system that can fail and can go wrong. We look very carefully at any change in the system under the auspices of increased safety and to not decrease safety. Let me assure you we are starting back, as Admiral Truly has testified, in reassessing every system and all of the elements of the shuttle system for its capability, what it has been certified to, and to assure that system does have required safety margins before we fly it.

RELIABILITY AND QUALITY ASSURANCE

Senator LEAHY. If we go to a replacement orbiter, I will be raising questions about the quality of standards that will be applied to the building of that, the assurance quality standards.

Do I have your assurance that in appropriating these funds we are not locking into contracts a quality assurance standard that may need later to be strengthened?

Dr. FLETCHER. Senator Leahy, let me start to answer that one, please.

Senator LEAHY. Yes.

Dr. FLETCHER. That is a question that I have had on my mind even before I came to NASA.

Senator LEAHY. Yes.

Dr. FLETCHER. It is not just what we call R&QA, reliability and quality assurance. It has to be done, I'm sure, better than we have been doing it, even though some of these newspaper articles are somewhat exaggerated in that regard.

We do, as part of the review of the whole program that Mr. Moser outlined, have to look at quality assurance. We are not going to skimp on that. It is not the number of people though. This is, I think, important to mention, it is not the number of people that count. It is the quality of the people and how they are organized to do the job.

Having said that, it is more than just quality assurance. It is the separate motivation and dedication of everyone that has to make a decision and that has a participating part in this whole program. This is starting way back at the subcontractor level, then how good is their quality control? How dedicated and motivated are their people? Are they trying to cut corners and so forth here? It is all the way up to the decisions, including the flight readiness review, that decisionmaking process; then, finally, the day of the launch and the decision to fire.

Now that Admiral Truly and his group has started, it is going to take a good part of this period to look over all these procedures to make sure that they are right. Quality control is one aspect of that.

Senator LEAHY. If I may close on that, Dr. Fletcher, I think that you will find that the members of this committee and really of any committee in the Senate, no matter how we feel one way or the other about the space station, about the shuttle or anything else, we are absolutely uniform in wanting the best of quality control.

Dr. FLETCHER. Yes.

Senator LEAHY. I think that I have heard over and over again expressions of concern when some minor part fails and holds everything up. Then you wonder just what kind of quality control went into this, whether a contractor or whether a subcontractor thought, "Well, this is really an insignificant part of the shuttle, an insignificant part. We don't really have to pay attention."

Of course, as you know, the number of times that launches have been delayed when it turns out afterward to be then a relatively insignificant part that did it. So we want that kind of quality assurance. You will get all of the backing in the world from every one of us in doing that.

Dr. FLETCHER. Yes.

Senator LEAHY. Because, again, to go back to my earlier statement, I find that the men and women who fly in these instruments give us the absolute best in quality. They give us their own dedication. They put their lives on the line. They have done everything to make sure that they are then qualified. What we have to do, of course, is to make sure that everything that goes with this is also.

Thank you, Dr. Fletcher.

Thank you, Mr. Chairman.

Dr. FLETCHER. Thank you, Senator.

REDESIGN OF THE SRB'S

Senator JOHNSTON. Mr. Chairman.

Senator GARN. Senator Johnston.

Senator JOHNSTON. Thank you, Mr. Chairman.

I know the investigation and the testing continues. But it is a virtual certainty now that the rocket failure was at the O-ring, is it not?

Dr. FLETCHER. That is my understanding. I would like to have a backup on that from Mr. Moser and a backup on that from Dr. Graham.

Mr. MOSER. That is correct, sir.

Senator JOHNSTON. Thank you.

Now you are proceeding with a redesign. I understand it is mechanically very difficult and a great challenge to have segments of rockets which are joined together and which have different mechanics of expansion and contraction and that have resistance to pressure and all of those different scientific terms.

In what direction are you going in the redesign? In other words, you are going to continue to have the segmented rocket boosters, as I understand it, are you not? Then how do you contemplate that this would be joined together?

Dr. FLETCHER. Mr. Moser had better answer that. That is over my head, Senator Johnston.

Mr. MOSER. First of all, we recognize from the accident the sensitivity of that joint to several things you pointed out. It is to the temperature, to tolerance, to assembly, and several other things.

The first thing that we are doing is the redesign effort which is currently underway in a conceptual stage right now, which is to desensitize that design to assure the utmost in reliability, to assure that we have total redundancy of that joint as far as the pressure integrity is concerned. On that, we have several concepts which are being looked at and that are being evaluated, being reviewed by people within NASA and outside NASA to grade our paper, if you will, to make sure that is, in fact, met. It will be an interface of segments in the gross sense of the details of the joints which is paramount in the redesign effort at this time.

Senator JOHNSTON. Can you assure that it will be safe through redundancy or through whatever kind of redesign, Mr. Moser?

Mr. MOSER. Yes, sir; we will assure that this will be safe.

CORRESPONDENCE STATING SRM UNSAFE TO FLY

Senator JOHNSTON. There is this memo that has been reported in the press to the effect that someone wrote that this was never safe, I think, under 50 degrees Fahrenheit, and some suggestion that this memo was not passed on, was—I am not saying squelched—that it was not passed on. What can you tell us about that memo?

Mr. MOSER. Senator, I can't get into details on that memo with you right now. I have not seen that. I would like to provide that to you later, if I may.

[The information follows:]

Attached is the memorandum of August 9, 1985, from Morton-Thiokol, Inc., to the Marshall Space Flight Center concerning SRM field joint secondary seal resiliency and timing.

MEMORANDUM FROM MORTON THIOKOL, INC.

AUGUST 9, 1985.

E150/BGR-86-17
Subject: Actions pertaining to SRM field joint secondary seal

Mr. JAMES W. THOMAS, Jr., SA42,
George C. Marshall Space Flight Center,
National Aeronautics and Space Administration,
Marshall Space Flight Center, AL

DEAR MR. THOMAS: Per your request, this letter contains the answers to the two questions you asked at the July Problem Review Board telecon.

1. *Question:* If the field joint secondary seal lifts off the metal mating surfaces during motor pressurization, how soon will it return to a position where contact is reestablished?

Answer: Bench test data indicate that the O-ring resiliency (its capability to follow the metal) is a function of temperature and rate of case expansion. MTI measured the force of the O-ring against Instron plattens, which simulated the nominal squeeze on the O-ring and approximated the case expansion distance and rate.

At 100° F. the O-ring maintained contact. At 75° F. the O-ring lost contact for 2.4 seconds. At 50° F. the O-ring did not reestablish contact in 10 minutes at which time the test was terminated.

The conclusion is that secondary sealing capability in the SRM field joint cannot be guaranteed.

2. *Question:* If the primary O-ring does not seal, will the secondary seal seat in sufficient time to prevent joint leakage?

Answer: MTI has no reason to suspect that the primary seal would ever fail after pressure equilibrium is reached, i.e., after the ignition transient. If the primary O-ring were to fail from 0 to 170 milliseconds, there is a very high probability that the secondary O-ring would hold pressure since the case has not expanded appreciably at this point. If the primary seal were to fail from 170 to 330 milliseconds, the probability of the secondary seal holding is reduced. From 330 to 600 milliseconds the chance of the secondary seal holding is small. This is a direct result of the O-ring's slow response compared to the metal case segments as the joint rotates.

Please call me or Mr. Roger Boisjoly if you have additional questions concerning this issue.

Very truly yours,

BRIAN G. RUSSELL,
Manager, SRM Ignition System.

Dr. FLETCHER. Dr. Graham was probably more heavily involved in that activity since he has been interacting closely with the Rogers Commission.

Dr. GRAHAM. Senator, we are still tracing all of the places that memorandum went.

Senator JOHNSTON. Who wrote the memorandum?

Dr. GRAHAM. That was written, as I recall, by engineers at Thiokol. I could check that for the record since there were several memorandums prepared from time to time on this issue. I believe it was submitted to the Marshall Space Flight Center for evaluation.

Senator JOHNSTON. When?

Dr. GRAHAM. If we are discussing the same memo, it was mid-last year.

Senator JOHNSTON. In the middle of last year?

Dr. GRAHAM. Yes.

TESTING OF THE O-RING

Senator JOHNSTON. That was long after the joint had been designed. This came up in routine testing or in the initial testing? How did they get the information?

Dr. GRAHAM. This was a follow-on testing that was done several years after the original design of that joint. It was to explore the performance of that joint under a range of temperature conditions.

Senator JOHNSTON. And this testing was routine or was caused by some suspicion that the joint might be vulnerable to this kind of problem?

Dr. GRAHAM. Senator, I believe that there was concern at the contractor and at the Marshall Space Flight Center over the erosion that had been observed in these field joints and the nozzle points during flight operations.

EROSION OF THE O-RING

Senator JOHNSTON. The joints, the nozzle joints, they are at the O-rings?

Dr. GRAHAM. Yes; they are joints sealed by the O-rings by putty behind that and the compression placed on the O-rings.

Senator JOHNSTON. When you say "erosion," is that in the same sense that I would use it, that you could see an actual deformation in the shape of the metal, a wearing away of the metal caused by, it would seem to me, to be caused there by a leak?

Dr. GRAHAM. It was a wearing away, not of the metal. Rather, it was a wearing away of the O-ring during the flight operation of the solid rocket, Senator.

Senator JOHNSTON. Wearing away would tend to suggest a leak, some kind of pressure.

Dr. GRAHAM. It suggested that some material was passing by the O-ring during the operation of that solid rocket booster; yes, sir.

Senator JOHNSTON. And how many times was that observed, the passage of material?

Dr. GRAHAM. I will provide you with the exact number for the record. As I recall, this was observed in approximately 14 instances over 24 flights. That is including both the field and nozzle joint.

[The information follows:]

There were 6 case field-to-field joints which experienced O-ring erosion and 15 nozzle-to-case joints that experienced O-ring erosion during flight.

Senator JOHNSTON. Now if there is a passage of material, that material would undoubtedly be the rocket engine propellent. I mean the gas or the flame, whatever, would this not then be?

Dr. GRAHAM. There was some material passing over it in all likelihood between the actual combustion products of the solid rocket booster and that O-ring. There is at the time of assembly a very small layer of grease, plus a substantial layer of putty. Then, beyond that, you get to the path to the combustion products.

O-RING TEST RESULTS

However, in testing subsequent to the accident, and in the disassembly of one solid rocket booster which was, in fact, assembled before the accident, we identified that there are paths that we call them.

Senator JOHNSTON. Pads?

Dr. GRAHAM. Paths.

Senator JOHNSTON. Paths?

Dr. GRAHAM. Yes; paths. We call them blow holes that appear to be created by air that is trapped in the joint passing through the putty perhaps at the time of assembly, perhaps at the time of pressure testing of the joint itself. Those may provide a path through the putty for combustion products of the engine to reach the O-ring.

The O-rings, of course, were originally designed for a primary O-ring and a secondary O-ring for a backup on the primary to protect it against erosion. There was subsequent testing of the distortion and pressures that exist in that chamber. These pressures are close to 1,000 psi inside the engine during ignition. The secondary O-ring may not seat properly. It was reclassified as not a backup system.

Senator JOHNSTON. In layman's terms, on 14 occasions you observed what would be, in effect, a leak at the O-ring calling for additional testing. That additional testing resulted in this memo indicating that at 50 degrees—am I correct—that at 50 degrees Fahrenheit and down, it was unsafe because there would be leakage. There would be deformation. There would be a failure.

Dr. GRAHAM. Senator Johnston, I saw all of this after the accident, much after the testing.

On the one hand, it was clear that as the temperature had decreased, the performance of those O-ring seals decreased substantially and, in fact, at the 50 degree range over the 10 minutes of the test, they did not seal at all. At 75 degrees it still took several seconds to seal.

On the other hand, the test rig was not a full-scale solid rocket booster field joint or nozzle joint. Now, the test setup wasn't identical to the assembly.

Senator JOHNSTON. It wasn't——

Dr. GRAHAM. It wasn't identical.

Senator JOHNSTON. Go ahead.

Dr. GRAHAM. The test setup wasn't identical to the——

Senator JOHNSTON. Excuse me; go ahead.

Dr. FLETCHER. Dr. Graham.

Dr. GRAHAM. It wasn't identical to the assembly.

Senator JOHNSTON. Not identical?

Dr. GRAHAM. The test rig was not a full-scale solid rocket booster field joint or nozzle joint. The test setup wasn't identical to the assembly that you would find in the flight situation. There was some consideration of difference between the test configuration and the flight configuration which was, in fact, substantial.

Senator JOHNSTON. One final question.

Dr. GRAHAM. Yes.

Senator JOHNSTON. It seems incredible to me that you could have, in effect, 11 failures, I say failures, some problems, incidents, involving the O-rings and in testing that there may be a problem. You test it. The testing indeed shows a clear problem, although not of the same size of a test as the main rocket, and a memo is written saying that. Somehow he memo gets lost in the shuffle.

Do you, at this time, have an explanation for why that is and what ind of corrective action has been taken to prevent that in the future?

Dr. FLETCHER. Senator Johnston.

Senator JOHNSTON. Dr. Fletcher.

Dr. FLETCHER. Senator Johnston, if I can interject a little bit.

Senator JOHNSTON. Yes.

Dr. FLETCHER. It seems incredible, as is described in the press and to nany of us, especially those of us who weren't there. On the other and, the Rogers Commission has, I think, done an excellent job probng into this. We are not privy to all of the things that they have come p with. But I suspect there will have to be some corrective action in he communications systems within NASA to deal with that problem.

As to the details of this, I think that we will really have to wait for e Rogers Commission report without making guesses as to what they ight say.

With that, I would now like to allow Dr. Graham to please continue. Ve are all a little bit concerned over that, Senator Johnston.

Senator JOHNSTON. Yes.

Dr. GRAHAM. Senator Johnston, all that I could add is that, in retroect, all of us are very concerned about that. There were indications where it is questionable that they should have been pursued in a much more specific and serious manner than they were. We are looking very hard at changing procedures, changing the way that we treat all safety-related items as a result of this.

Senator JOHNSTON. Thank you.

Dr. GRAHAM. Yes, sir.

Senator JOHNSTON. Thank you, Mr. Chairman.

Senator GARN. Senator Proxmire.

Senator PROXMIRE. Thank you, Mr. Chairman.

Dr. Fletcher, I'd like to follow up, if I might, with Mr. Moser and Dr. Graham on the questions that were being asked by the Senator from Louisiana a little differently at this time, Doctor.

Dr. FLETCHER. Yes.

PROPOSAL FROM AEROJET

Senator PROXMIRE. In an article appearing in the May 12 issue of Aviation Week and Space Technology, they reported that Aerojet General, and I am quoting here:

> Aerojet General has told NASA that the reliability of the space shuttle's solid rocket booster could be improved by casting a propellent in one piece eliminating the field joints where the motor's four segments are joined.

Of course, if there were no field joints, we would avoid the possibility of the catastrophic joint rupture that destroyed *Challenger.*

Aerojet said that the delivery of the first booster could come 15 months after NASA gave the go-ahead.

I wonder if you are seriously exploring that approach to fixing the solid rocket booster [SRB] and what your technical judgment is on that assessment?

Dr. FLETCHER. Dr. Graham.

Dr. GRAHAM. Senator Proxmire, we did receive a proposal from Aerojet. We are looking at it very seriously. We have reached no conclusion, sir. It may seem evident at the outset that going to a one-piece case with no field joints is unquestionably a better solution. I think that this requires more scrutiny than that to come up here with a definitive conclusion for a number of reasons.

These SRB's are about 150 feet long and 12 feet in diameter. They are very, very large objects. Casting a propellent in one piece in that size of object is a very difficult thing to do. This must be done, of course, with great precision and with great reliability if it is to function properly in flight, Senator.

In addition, there is the question of handling an object which weighs a little over 1 million pounds, such as these SRB's would after they were cast, and getting them from the casting facility to the flight launch pad.

Senator PROXMIRE. Let me just read the last part of this now.

Dr. GRAHAM. Yes.

Senator PROXMIRE. It says:

> The Florida facility where the firm developed and fired solid motors more than 21 feet in diameter in the 1960's has a 152-foot-deep diameter casting pit where four

shuttle motors at a time could be cast. Boosters could be barged from a Dade County facility to the Kennedy Space Center, both Kennedy and Vandenberg Air Force Base, CA, equipped with barge terminals.

Dr. GRAHAM. Yes, sir; one consideration that is not insurmountable by any means but that needs to be addressed is actually handling these objects to put them on the barge, take them off the barge, and so on. Crane facilities for that would have to be built.

There is a safety-related concern that we want to address carefully in the handling of the fully assembled object, which isn't done in the present way that the SRB's are assembled now. Rather, they are assembled on a stack and they are left there. Would that possibly create related safety problems?

I only set these out as issues that have to be addressed, not as a conclusion.

DEVELOPMENT COST OF SRB—SINGLE-CAST PROPELLANT

Senator PROXMIRE. Doctor, let me ask you this. Do you have any idea how much that it would cost to develop the solid rocket booster with a single-cast propellent?

Dr. GRAHAM. If I may.

Senator PROXMIRE. Yes.

Dr. GRAHAM. If I may make one last point.

Senator PROXMIRE. I beg your pardon.

Dr. GRAHAM. That is, that even with a case which has no field joints, the joints are covered with insulation from within before the casting is done. We are concerned that a nozzle joint would have to be installed after the casting was done to mount the nozzle on the assembly. We are very concerned about the nozzle joint, as well as the case joint itself. So there still would be a joint issue, we believe, even here.

As far as the cost is concerned, NASA has not as yet made an evaluation of this process or the schedule that would be required. However, as a preliminary indication, I believe that a 15-month schedule is a very, very optimistic schedule. That, I believe, was the production of the first item.

Now the thing that takes the greatest time in all of these SRB redesign issues is the time to do the engineering development tests and the several qualification tests that involve the firing of full-scale motors at test facilities, as well as other structural tests. Those would add very substantially to that time, as they, in fact, add to and control the time of the other redesign schemes.

BUDGET REDUCTIONS IN FISCAL YEARS 1974 AND 1975

Senator PROXMIRE. Dr. Fletcher, in a letter to Senator Gore dated April 28 of this year you said, and I quote:

> In the early years of the shuttle program, some reductions were made in our budget request which caused delay in some of the early design and technology effort. These reductions were significant relative to the amount requested at that time, about 10 to 15 percent in fiscal years 1974–75, as I remember it.

That leaves the clear impression that Congress cut your budget request. Yet, I can tell you as chairman of the subcommittee during that time, that NASA told us that the money was not needed.

Here is what NASA said in 1975 in response to the GAO allegations that work had been deleted, deferred, or reprogrammed to align the shuttle development program within determined cost ceilings.

I will quote:

> There are adequate funds available to carry out the space shuttle development and the GAO staff study could be seriously misleading in the development status of the space shuttle and NASA's cost commitment to the Congress to develop this space shuttle for $5.2 billion in 1971 dollars.

That comment seems to directly contradict the statement in your letter to Senator Gore.

Can you reconcile these two statements?

Dr. FLETCHER. Senator Proxmire.

Senator PROXMIRE. Dr. Fletcher.

Dr. FLETCHER. Senator Proxmire, you are absolutely right. The committee that you chaired at that time did not cut our budget. It was cut within the OMB. We lived with that.

There were two cuts, as you may recall. I can't remember dates. One was in about 1974, fiscal 1974. We did the best that we could to accommodate that cut. I don't remember if it was 10 or 15 percent. But we knew that would impact on the program, but we didn't know the details.

The second cut, however, was enough so that we had to really slip the date on which we would fly. As I can now recall, we slipped the first flight from 1978 to 1979.

Now both of those things had an impact on the program.

However, in the case of the overall cost of the program, we didn't increase it very much. In fact, we stayed within that cost that we predicted in front of your committee back in the 1972–73 period. The cost, for example, that we had then anticipated, was, as I recall, $5.5 billion in fiscal year 1971 dollars. We indicated a 10-percent reserve contingency on top of that. We did stay within those costs.

What happened down in the organization as we moved things along is something that you always are concerned about because you can't be sure where shortcuts might have been made, and so forth, that might have caused increases later on. Apparently there were no development cost increases. I don't know of any safety issues that were caused by those cuts. On the other hand, that really needs to be checked for the record.

WAIVERS ALLOWING THE SHUTTLE TO FLY

Senator PROXMIRE. Dr. Fletcher, let me ask you this.

Dr. FLETCHER. Yes.

Senator PROXMIRE. Today's hearing, as I understand it, is intended to consider a cost, the cost, of correcting the shuttle anomalies. I would like to explore with you the extent to which they extend beyond the solid rocket booster, Dr. Fletcher.

Dr. FLETCHER. Yes.

Senator PROXMIRE. Lawrence Malloy was reported recently to have said the six waivers allowing the shuttle to fly despite those faulty SRB joints was nothing more than a routine way to ensure that problems were being addressed.

If the waivers were indeed routine, I would like to know what other waivers were given over the life of the shuttle, what underlying conditions led to the need to give waivers so that the shuttle could be launched, and how many of those underlying problems remained to be fixed?

Dr. FLETCHER. Senator Proxmire, I can't give you a detailed answer to that question. There were a large number of waivers over the years. Not too many waivers were made during my tour which ended in 1977 that were of major proportions. Otherwise I would have remembered them.

Perhaps Dr. Graham or Mr. Moser have looked at this in some depth and would be able to give you a better answer on what happened after I left.

Mr. MOSER. Senator Proxmire, to answer your question specifically, to identify and to explain all of the waivers, we would have to provide that for the record. There are a large number of them. I do not have that data here with me today, Senator.

Every one of the waivers, prior to any flight, is looked at, is scrutinized in flight readiness reviews. That is where the rationale, the documentation, comes to culmination.

Senator PROXMIRE. Will you provide that for the record, then, please?

Mr. MOSER. Yes, sir; we will do that.

[CLERK'S NOTE: The criticality I waivers and level II deviation waivers, volumes I, IV, and X are printed in their entirety. The remaining (approximately 500) additional pages are being kept in the subcommittee file for future individual access.]

CRITICALITY 1 WAIVERS

ET

STS 1	6 WAIVERS
2-3	9 "
4	12 "
5	16 "
6	22 "
7-8	21 "
9-12	22 "
13-25	23 "
LWT 1 & 2	2 WAIVERS
LWT 3 & up	1 WAIVER
HWT 2-4	1 WAIVER

CRITICALITY 1 WAIVERS

ET

PRCBD #	EFFECT	# WAIVERS
S02106TR1	STS 1 & UP	1
S02106WR1	STS 1 & UP	1
S02106YR1	STS 1 & UP	1
S02106ZR1	STS 1 & UP	3
S20718	LWT 1 & UP	1
S22106AR1	STS 2 & UP	2
S22106ER1	STS 5 & UP	4
H22106HR1	STS 4 & UP	3
H22106KR1	STS 6 & UP	1
S22106NR1	STS 6 & UP	5
S22106Q	STS 13 & UP	1
S42877B	HWT 2-4	1
S52877H	LWT 1 & UP	1
S87040	STS 9 & UP	1
S67217R1	STS 2-6	1

CRITICALITY 1 WAIVERS

SRB

STS 1	11 WAIVERS
STS 2	12 "
STS 3	12 "
STS 4	14 "
STS 5	12 "
STS 6	13 "
STS 7	25 "
STS 8-25	25 "

CRITICALITY 1 WAIVERS

SRB

PRCBD #	EFFECT	# WAIVERS
S02106N	STS 1-6	1
S02106P	STS 1-6	2
S02106QR2	STS 1-6	1
S02106RR1	STS 1-5	1
S02106UR1	STS 1 & UP	2
S02106VR1	STS 1-4	1
S22106R1	STS 1 & UP	2
S22106CR2	STS 4 & UP	2
S22106DR1	STS 1 & UP	1
H22106LR2	STS 6 & UP	2
S22106PR1	STS 7 & UP	16
S6721741	STS 2-6	1

CRITICALITY 1 WAIVERS

SSME

PRCBD #	EFFECT	# WAIVERS
S02106K	STS 1 & UP	2
H22106FR1	STS 4 & UP	2

STS 1-3	4 WAIVERS
STS 4-25	2 "

CRITICALITY 1 WAIVERS

ORBITER

STS 1	18 WAIVERS
2	15 "
3	21 "
4	23 "
5	12 "
6	9 "
7	9 "
8	9 "
9	11 "
10	5 "
11	10 "
12	8 "
13	16 "
14	19 "
15	19 "
16	19 "
17	19 "
18	19 "
19	19 "
20	22 "
21	22 "
22	22 "
23	22 "
24	22 "
25	23 "
OV-102	2 "

CRITICALITY 1 WAIVERS

ORBITER

PRCBD #	EFFECT	# WAIVERS
S13442AR6	STS 6-8	1
S1344ZAR12	STS 1-4	3
S04814R1	OV-102	1
S05698BR1	STS 1-4	1
S16569B	OV-102	1
S16569D	STS-1 ONLY	3
S16569E	STS 1-4	3
S16569ER1	STS 1-4	2
S16569F	STS 1-4	1
S16569GR1	STS 1-4	3
S16569JR1	STS 1-4	1
S16569LR1	STS 3 & 4	3
S16569PR1	STS 5 ONLY	3
S16569TR1	STS 4 & 5	3
S16569VR1	STS 5-9	3
S16569WR1	STS 6-8, 10 & UP	3
S20911	STS 3-5 & 9	3
S20987CR2	STS 6-13	2
S373OR1	STS 13 & UP (OV-099)	1
S26569AR1	STS 11 & UP	3
S26569G	STS 9 ONLY	3
S26569L	STS 13 & UP	3
S26569M	STS 13 & UP	3
S26569N	STS 14 & UP	3
S26569P	STS 14 & UP	3
S26569Q	STS 20 & UP	3
S26569U	STS 25 & UP	1
S36896R1	STS 1-4	1
H21484	STS 4 ONLY	1
S20987CR2	STS 11 & 13	1

JSC 07700
VOLUME I
REVISION A

SPACE SHUTTLE PROGRAM

PROGRAM DESCRIPTION AND REQUIREMENTS BASELINE

LEVEL II PROGRAM DEFINITION AND REQUIREMENTS
VOLUME I - REVISION A

LEVEL I PRD

DEVIATIONS/WAIVERS AUTHORIZED FOR REQUIREMENTS CONTAINED IN THIS DOCUMENT

1. REQUIREMENT: Paragraph 2.6 CABIN ATMOSPHERE. The Orbiter crew and passenger environment shall be a shirt sleeve, nominal 14.7 psi (760 mm Hg.), two gas atmosphere (nitrogen-oxygen) to simulate sea level composition.

WAIVER: For OFT flights, Paragraph 2.6 is waived to allow depressurization of the cabin to 9 psia with up to 30% oxygen for up to 67 hours for pre-EVA and EVA operations.

AUTHORITY: Level I approval Letter MPE-5, dated 6/13/80.

2. REQUIREMENT: Paragraph 2.6 CABIN ATMOSPHERE. The Orbiter crew and passenger environment shall be a shirt sleeve, nominal 14.7 psi (760 mm. Hg.), two gas atmosphere (nitrogen-oxygen) to simulate sea level composition.

WAIVER: For STS-5 through STS-8, STS-11, STS 41-C and subsequent EVA operations excluding Spacelab Missions, Paragraph 2.6 is waived to allow depressurization of the cabin to 10.2 psia with up to 30% oxygen for pre-EVA and EVA operations.

AUTHORITY: Level I Change Request's H13442A, dated 6/23/82; H13442G, dated 12/22/83 and H13442K, dated 6/20/84.

3. REQUIREMENT: Paragraph 3.8 LAUNCH FROM STANDBY. The Space Shuttle System design shall provide the capability to be launched from a standby status within 2 hours, and hold in a standby status for 24 hours.

WAIVER: For KSC launches, Paragraph 3.8 is waived for STS-7 thru STS-30 to allow the time from standby to launch to be 8.5 hour capability.

AUTHORITY: Level I Change Request H22315, dated 6/15/83.

DEVIATIONS/WAIVERS AUTHORIZED FOR REQUIREMENTS CONTAINED IN THIS DOCUMENT - Concluded

4. REQUIREMENT: Paragraph 2.3 PAYLOAD BAY GEOMETRY. The payload bay shall be sized to have a clear volume of 15 ft. (4.5 meters) diameter by 60 ft. (18.2 meters) length. Payloads including their thermal and dynamic deflections shall be contained in an envelope equal to or less than 15 ft. (4.5 meters) in diameter and 60 ft. (18.2 meters) length. Payload attachment fittings and umbilicals shall extend beyond this envelope in order to mate with standard Orbiter fittings which are outside the payload envelope. A standard deployment mechanism and tie points shall be chargeable to the Orbiter vehicle and shall not occupy the clear volume when stowed. Clearance for deployment and Orbiter deflections shall be provided by the Orbiter vehicle. Available payload volume is reduced when the Orbiter Maneuvering System (OMS) incremental delta V tankage or the docking module is carried.

WAIVER: For STS-11, Paragraph 2.3 is waived to allow the SPAS-01 camera to physically exceed the payload containment envelope by 1.01 inches.

AUTHORITY: Level I Change Request H23877, dated 1/30/84.

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME I

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
	LEVL I APP, CABIN ATMOSPHERE WAIVER FOR OFT, MPE-5, 6-13-86	SS	STS 1-4	1	3	V01
S13442AR12	REVISE CABIN PRESSURE TO 11 PSIA TO ELIMINATE EVA PRE-BREATHE (H13442G)	SS	STS 6-8 11&13	2	1	V01
S22315B	LAUNCH FROM STANDBY (H22315)	SS	STS 7-30	3	2	V01
S23877	WAIVER OF SPA-S-01 CAMERA PROTRUSION INTO PAYLOAD ENVELOPE	GFE	STS 11 ONLY	4	2	V01
	JSC 07700, VOLUME IV					
S13524	REVISE ULLAGE PRESSURE TRANSDUCER CRITERIA	ET	STS 1&2	2		V04
S13737	WAIVER TO ICD CROSS REFERENCE INDEX	ORB	STS 1&UP	4	3	V04
S37704A	ALLOW USE OF MORE THAN 15 CHARACTERS FOR SRB PART NUMBERS	SRB	STS 1-6	3	3	V04

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S00183C	SSME SMALL LINES FACTOR OF SAFETY	SSME	STS 1&UP	85	2	V10
S02106K	SSME CRITICAL ITEMS LIST WAIVERS	SSME	STS 1&UP	53,54	1	V10
S02106N	SRB CRITICAL ITEM REQUIREMENT CHANGE - PYROS FAIL SAFE	SRB	STS 1-6	64	1	V10
S02106P	SRB CIL REQUIREMENTS CHANGE - TVC CONTROL	SRB	STS 1-6	65,66	1	V10
S02106QR2	SRB CIL WAIVER FOR TVC TURBINE	SRB	STS 1-6	107	1	V10
S02106RR1	SRB CIL MDM WAIVER	SRB	STS 1-5	108	1	V10
S02106TR1	ET CIL WAIVER FOR FAIL SAFE OF LO2 FEEDLINE SEALS GH2 DIFFUSER, DFI TEMP PROBE, AND ET/SRB ELECT CABLES	ET	STS 1&UP	109	1	V10
S02106UR1	SRB CIL WAIVER FOR TVC GAS GENERATOR VALVE, P/N 57800	SRB	STS 1&UP	110,111	1	V10
S02106VR1	SRB CIL WAIVER FOR RANGE SAFETY DECODER A&B ARM & FIRE COMMAND CABLES	SRB	STS 1-4	112	1	V10
S02106WR1	ET CIL ITEMS	ET	STS 1&UP	142	1	V10
S02106YR1	ET CIL ITEMS	ET	STS 1&UP	140	1	V10
S02106ZR1	ET CIL ITEMS	ET	STS 1&UP	28,138,139	1	V10
S02952D	WAIVER FOR FAST SEP CAPABILITY IN BFS	ET	STS 1 ONLY	86,87		V10
S03655L	DEVIATION TO MIL-STD-1247 FOR HELIUM INJECTION TUBE ASSEMBLIES	ET	STS 6&UP	150		V10
S03834C	WAIVER OF REQUIREMENT OF 2 HOUR LAUNCH FROM STANDBY	SS	VAFB	55		V10
S03834D	TIME REQUIREMENT FROM NOTIFICATION TO LAUNCH & STANDBY TO LAUNCH	SS	KSC	56,57	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S04267A	EJECTION ESCAPE SUIT CIL	GFE	STS 3&UP	PRCBD	1	V10
S04354E	BASELINE FILTER MATRIX REPORT 72838 (H04354G) (S04354H)	ORB	STS 1-15	144	2	V10
S04814R1	OV-102 EEE PARTS TRACEABILITY REQUIREMENTS WAIVER	ORB	OV-102	52	1	V10
SC4994T	DEVIATION TO PRESS STABILIZATION OF LO2 TANK (FLIGHT & MPTA)	ET	STS 1-8	119,120,121	2	V10
S05185	DEVIATION TO MIL-H-5440F FOR FLUID TEMP, LIMITATION	ORB	STS 1&UP	63	2	V10
S05185A	DEVIATION TO HYDRAULIC SPECIFICATION MIL-H-5440 FOR IMMERSION TEMPERATURE REQUIREMENT	ORB	STS 9&UP	243	2	V10
S05203E	WAIVER FLOW INDUCED VIBRATION DESIGN REQUIREMENTS FOR THE 16 INCH LO2 FEED LINE BELLOWS AT VANDENBERG	VLS	STS 1V&UP (VLS)	PRCBD	2	V10
S05203F	WAIVER FLOW INDUCED VIBRATION DESIGN REQUIREMENTS FOR THE 8 INCH LO2 RETURN LINE BELLOWS AT VANDENBERG	VLS	STS 1V ONLY	PRCBD	2	V10
S05321A	EFFECTIVITY OF 109% THRUST ON SSME FLIGHT ENGINES	SSME	STS 1&UP	50	2	V10
S05321C	EFF OF 109% THRUST ON SSME FLT ENGINES	SSME	STS 2-4	50	2	V10
S05532	KSC CRITICAL CATEGORY 1, 1S, 2 - SEP CIL (GSE FAIL SAFE)	L&L	STS 1&UP	72	1	V10
S05532B	KSC CIL ITEMS	L&L	STS 1&UP	72	1	V10
S05532C	KSC CIL ITEMS	L&L	STS 1&UP	72	1	V10
S05532D	KSC CIL	L&L	STS 1&UP	72	1	V10
S05532E	KSC CIL	L&L	STS 2&UP	72	1	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S05698BR1	ORB CIL	ORB	STS 1-4	101	1	V10
S05761R2	KSC CRITICALITY CATEGORY 1S (GSE)	L&L	STS 1-6	69	1	V10
S07144D	SRM DEVIATION REQUEST TO LVL II SCREW THREAD REQUIREMENTS	SRB	STS 1-6	58	3	V10
S10001	DEVIATION TO JSC 07700, VOLUME X (SE-R-0006)	CENT	STS 35&36	238	2	V10
S10002	DEVIATION TO JSC 07700, VOLUME X (SE-R-0006)	CENT	STS 35&36	239	2	V10
S10007	DEVIATION TO JSC 07700, VOLUME X (SE-R-0006)	CENT	STS 35&36	240	2	V10
S10010	DEVIATION TO JSC 07700, VOLUME X (SE-R-0006)	CENT	STS 35&36	241	2	V10
S10020	DEVIATION TO JSC 07700, VOLUME X (MIL-STD-130D(1))	CENT	STS 35&36	231	2	V10
S10021	DEVIATION TO JSC 07700, VOLUME X (MIL-STD-130D(1))	CENT	STS 35&36	232	2	V10
S10022	DEVIATION TO JSC 07700, VOLUME X (MIL-STD-130D(1))	CENT	STS 35&36	242	2	V10
S10023	WAIVER OF SPEC MIL-STD-462(2) - METHOD CS03	CENT	STS 35&36	257	2	V10
S10024	WAIVER OF SPEC MIL-STD-462(2) - METHOD CS05	CENT	STS 35&36	258	2	V10
S10025	WAIVER OF SPEC MIL-STD-462(2) - METHOD RE03	CENT	STS 35&36	259	2	V10
S10026	WAIVER OF SPEC MIL-STD-1247B	CENT	STS 35&36	249	2	V10
S10027	WAIVER OF SPEC MIL-STD-1247B	CENT	STS 35&36	250	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S10028	WAIVER OF SPEC JSC 07636B	CENT	STS 35&36	253	2	V10
S10029	WAIVER OF SPEC JSC 07636B	CENT	STS 35&36	260	2	V10
S10030	WAIVER OF JSC 07700, VOL X, APPENDIX 10.16, SHUTTLE SYSTEM REQUIREMENTS FOR SHUTTLE/CENTAUR STAGE AND AIRBORNE SUPPORT EQUIPMENT (PARA 3.2.2.1.17.1)	CENT	STS 35&36	PRCBD	2	V10
S10034	WAIVER OF SPEC MSFC-SPEC-250A	CENT	STS 35&36	261,262	2	V10
S10039	WAIVER OF SPEC NHB 5300.4(1D-2) OCT 1979 SAFETY, RELIABILITY, MAINTAINABILITY AND QUALITY PROVISIONS FOR THE SPACE SHUTTLE PROGRAM (PARA 1D300-26)	CENT	STS 35&36	PRCBD	2	V10
S10040	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1976, RQTS FOR SOLDER ELECTRICAL CONNECTIONS (PARA 3A301-1)	CENT	STS 35&36	302	2	V10
S10041	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1979, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS (PARA 3A311.2)	CENT	STS 35&36	PRCBD	2	V10
S10042	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1979, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS (PARA 3A600)	CENT	STS 35&36	PRCBD	2	V10
S10043	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1976, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS (PARA 3A600)	CENT	STS 35&36	PRCBD	2	V10
S10045	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	263	2	V10
S10046	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	264	2	V10
S10047	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	265	2	V10
S10048	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	266	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S10049	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	267	2	V10
S10050	WAIVER OF SPEC SL-E-0002A	CENT	STS 35&36	268	2	V10
S10058	WAIVER OF SPEC NHB 5300.4(3A-1), DEC 1976, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS WITH APP C TO EXHIBIT A, 3 JAN 1981, PARA. 3A503-1	CENT	STS 35&36	281	2	V10
S10084A	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10086A	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10087A	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10089A	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10090A	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10094	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10095	WAIVER OF SPEC MIL-P-55110C(3), 16 OCT 1980, PRINTED WIRING BOARDS	CENT	STS 35&36	PRCBD	2	V10
S10098	WAIVER OF SPEC NHB 5300.4(3A-1), DEC 1976, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS, WITH AMENDMENT 1 (PARA 3A601)	CENT	STS 35&36	282	2	V10
S10099	WAIVER OF SPEC NHB 5300.4(3A-1), DEC 1976, RQTS FOR SOLDERED ELECTRICAL CONNECTIONS (PARA 3A500, SUBPARA 8)	CENT	STS 35&36	303	2	V10
S10101A	WAIVER OF SPEC JSCM 8080 STD 29	CENT	STS 35&36	269	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S10105	WAIVER TO SPEC JSCM 8080-95E, 2 MAR 1982, MANNED SPACECRAFT CRITERIA AND STANDARDS	CENT	STS 35&36	283	2	V10
S10108	WAIVER OF SPEC JSCM 8080, 1 FEB 80, MANNED SPACECRAFT CRITERIA AND STANDARDS (STANDARD NO. 134)	CENT	STS 35&36	289	2	V10
S10109A	WAIVER OF SPEC JSCM 8080 STD 148	CENT	STS 35&36	270	2	V10
S10112	WAIVER TO PARA 4.5.3.2.2 OF SPEC JSC 08060, REV D, DTD 29 JULY 1983, SPACE SHUTTLE SYSTEM PRYOTECHNIC SPEC	CENT	STS 35&36	PRCBD	2	V10
S10113	WAIVER OF SPEC JSC 07700, VOL X, APP 10.16, 30 SEPT 1983, SHUTTLE SEP RQTS FOR SHUTTLE/CENTAUR STAGE & AIRBORNE EQUIPMENT, PARA 3.6.15.1, NHB 5300.4 (3A-1)	CENT	STS 35&36	304	2	V10
S10114	WAIVER OF SPEC JSC 07700, VOL X, APP 10.16, 30 SEPT 1983, SHUTTLE SEP RQTS FOR SHUTTLE/CENTAUR STAGE & AIRBORNE EQUIPMENT, PARA 3.6.15.1, NHB 5300.4 (3A-1)	CENT	STS 35&36	305	2	V10
S10122	WAIVER OF SPEC JSCM 8080 CHG 10, 2 MAR 1982, MANNED SPACECRAFT CRITERIA AND STANDARDS, STANDARD 133D	CENT	STS 35&36	290	2	V10
S10127	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1976, RQTS SOLDERED ELECTRICAL CONNECTIONS PARA 3A400-3	CENT	STS 35&36	306	2	V10
S10128	WAIVER OF SPEC NHB 5300.4(3A-1) DEC 1976, RQTS SOLDERED ELECTRICAL CONNECTIONS PARA 3A400-7 AND 3A600-9	CENT	STS 35&36	307	2	V10
S10129	DEVIATION FROM NASA SPEC NHB 5300.4 (3A-1) DEC 1976, REQTS FOR SOLDERED ELECTRICAL CONNECTION PARA 3A309	CENT	STS 35&36	308	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S10130	DEVIATION FROM NASA SPEC NHB 5300.4 (3A-1) DEC 1976, REQTS FOR SOLDERED ELECTRICAL CONNECTION PARA 3A600-11	CENT	STS 35&36	309	2	V10
S10132	DEVIATION TO MIL-STD-1247B, MARKINGS, FUNCTIONS AND HAZARD DESIGNATIONS OF HOSE, PIPE AND TUBE LINES FOR AIRCRAFT MISSILES AND SPACE SYSTEMS	CENT	STS 35&36	PRCBD	2	V10
S13175B	REV TO LH2 TANK AFT BULKHEAD PRESS REQUIREMENT	ET	HWT 1-7	67	2	V10
S13175G	REV TO LH2 TANK AFT BULKHEAD PRESSURE	ET	HWT 1-7	76	2	V10
S13175MR2	PROPELLANT TOPPING, REPLENISH STANDBY	ET	STS 2 ONLY	123		V10
S13175P	STABILIZATION OF LH2 TANK AFT DOME	ET	HWT 1-7	123	2	V10
H13175T	WAIVER TO LAUNCH TO STANDBY REQUIREMENT	ET	STS 1-6	122	2	V10
S13175Y	PROPELLANT LOADING	ET	HWT 2-6	123	2	V10
S13414	MMU PRESSURE GAGE-EXCEPTION TO STD 38A OF JSCM 8080	GFE	MMU 1&UP (STS 11&UP)	77		V10
S13414A	MMU-EXCEPTION TO 8080, STANDARD 38A	GFE	MMU 1&UP (STS 11&UP)	251	2	V10
S13442AR12	REVISE CABIN PRESSURE TO 11 PSIA TO ELIMINATE EVA PRE-BREATHE	SS	STS 6-8 11&13	209,210	1	V10
S13443C	WAIVER REQUEST FOR PRE-EVA CABIN DEPRESS TO 9 PSIA	SS	STS 1-4	70,71	3	V10
S13733	PORTABLE OXYGEN SYS CIL WAIVER FOR FURTHER REDUNDANCY IN DESIGN	SS	STS 1-5	113,114	1	V10
S13733AR1	PORTABLE OXYGEN SYSTEM CIL (H13733A)	SS	STS 3&4	113,114	1	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S13806AR1	RMS CIL	RMS	STS 2&UP	182	1	V10
S13806ER1	RMS CIL	RMS	STS 2 ONLY	182		V10
S13806FR1	RMS CIL (H13806F) (H13806G)	RMS	STS 3&UP	182	1	V10
H13806HR1	RMS CIL	RMS	STS 7&UP	182,233	1	V10
S13807	PERSONNEL EGRESS AIR PACK CIL WAIVER	GFE	STS 1-5	115,116	1	V10
S13807AR1	PERSONNEL EGRESS AIR PACK CIL (H13807A)	GFE	STS 3&UP	116	1	V10
S13807BR1	PERSONNEL EGRESS AIR PACK CIL (H13807B)	GFE	STS 5&UP	115,116	1	V10
S13930A	UMBILICAL HYDRAULIC ACTUATORS FAILED TEST-ET (S13930B)	ORB	STS 1-4	73	2	V10
S14116	JSCM 8080 STD 109 ETCHING FLUOROCARBON INSULATED ELEC WIRE	GFE	MMU 1-3 (STS 11&13)	156		V10
S14176	ORB APU SUBSYSTEM	ORB	STS 1-4	73	2	V10
S14240	WAIVE SGL POINT HAZARDS IN RI ORBITER GSE USED AT KSC	L&L	STS 1&UP	88	2	V10
S14240A	SINGLE POINT HAZARD (SPH) IDENTIFICATION	ORB	STS 1&UP	124	2	V10
S14304BR1	WAIVE JSCM 8080 STD 20A REDUNDANT CIRCUITS IN SAME CONNECTOR	ET	STS 2-8	157	2	V10
S14366	INABILITY TO THROTTLE SSMES TO STAY WITHIN 3.0 "G" LIMIT	SSME	STS 1&UP	78	2	V10
S14471DR2	S-BAND SWITCHED BEAM ANTENNA PERFORMANCE	ORB	STS 6&UP	213	3	V10
S14589	SEPARATION OF WIRING ON REDUNDANT ELEC ITEMS	ET	STS 1 ONLY	79		V10
S14697	EMU CIL WAIVER	GFE	STS 1&UP	117,118	1	V10
S14697AR1	EMU CIL (H14697A)	GFE	STS 3&UP	117,118	1	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S14697BR1	EMU CIL (S14697B)	GFE	STS 11&UP	117,118	1	V10
S14710	WAIVER FOR SRB RGA	SRB	STS 1&UP	89	2	V10
S14770R1	WAIVER TO ET/SRB SEPARATION-NOMINAL MODES	SRB	STS 1&UP	90	2	V10
S14772	WAIVER FOR SRB STAGING TIME INCREMENT	SRB	STS 1-4	91	2	V10
S14779R1	WAIVER FOR ORB/ET DESIGN STAGING CONDITIONS (RTLS) (S14779A)	ORB	STS 1-2	92		V10
S14894	WAIVER TO MSCM JSCM 8080 SPECS FOR THE AFT FUSELAGE GAS SAMPLER	ORB	STS 1-8	93	2	V10
S14894R2	WAIVE JSCM 8080 FOR AFT FUSELAGE GAS SAMPLER	ORB	STS 1&UP	94	2	V10
S14902	MMU WAIVER-LOCATER LIGHT SYSTEM CONVERTER EMI	GFE	MMU 1-3 (STS 11&13)	125		V10
S14903	APPLICABILITY FOR HAND HELD RADIO BATTERY (S14903A)	GFE	STS 1&UP	96	1	V10
S14907A	DEVIATION TO MIL-H-5440F PEAK PRESS FOR LANDING GEAR ACTUATION	ORB	STS 1 ONLY	97		V10
S14907B	WAIVER TO MIL-H-5440F PEAK PRESS FOR LANDING GEAR ACTUATION	ORB	STS 1-5	97	2	V10
S14908A	DEVIATION TO MIL-H-5440F PEAK REQ FOR BODY FLAP ACTUATION SYS	ORB	STS 1 ONLY	98		V10
S14908B	WAIVER TO MIL-H-5440F PEAK PRESS FOR BODY FLAP ACTUATION	ORB	STS 2-5	98	2	V10
S14908C	INCREASE IN ALLOWABLE BODY FLAP HYDRAULIC PRESSURE SPIKES	ORB	STS 6&UP	4	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S14909	USE OF FUNGUS NUTRIENT IN MANIPULATOR SYSTEM (STS-2)	GFE	STS 2&UP	126	2	V10
S14913	EMI WAIVER FOR ORBITER EVA/ATC TRANSCEIVER (VOL X)	ORB	STS 1 ONLY	127		V10
S14918R1	CMST CIL	GFE	STS 1-4	141	1	V10
S14918AR1	CMST CIL	GFE	STS 2&UP	184	1	V10
S14918B	CMST CIL	GFE	STS 3&UP	PRCBD	1	V10
S15088	EMI OUT-OF-SPEC CONDITION FOR INTERMIN TELEPRINTER SYSTEM	SS	STS 1-6	128	3	V10
S15101	WAIVER FOR EVA SUPPORT EQUIP	SS	STS 1 ONLY	99		V10
S15101A	WAIVER TO EXISTING WAIVER 99 FOR EVA SUPPORT EQUIPMENT	GFE	STS 1&UP	99	2	V10
S15115C	JSCM 8080 TPS INSPECT CAMERA	GFE	STS 2-4	158,159,160, 161,162	2	V10
S15121	RMS WAIVER RFD/W 084 MECH ARM SUBSYSTEM CONN SEALING	RMS	STS 2&UP	145	2	V10
S15122	RMS WAIVER RFD/W 072B MTR WITH GSI ON ELECT WIRE AND CABLE	RMS	STS 2&UP	146	2	V10
S15128	NHB 5300.4(3A-1) REQUIREMENTS FOR SOLDERED ELECTRICAL CONNECTIONS	SS	STS 1-5	100	2	V10
S15163	RTLS SEPARATION PERFORMANCE FOR FIRING JET	ORB	STS 1&UP	129	2	V10
S15228	RMS WAIVER RFD/W 097 END EFFECTOR SPECIAL PURPOSE CONN	RMS	STS 2&UP	147	2	V10
S15282D	SRB DEBRIS (S15282H)	SRB	STS 3-6	191	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S15282GR2	DEBRIS	SS	STS 4 ONLY	207,208	1	V10
S15304A	WAIVE JSCM 8080 STD 95C FOR CABLES	GFE	STS 2&UP	149	2	V10
S15304B	DEVIATION FROM JSCM 8080 STD 95C FOR SHUTTLE AUDIO CABLES	GFE	STS 2&UP	151	2	V10
S15304C	WAIVE JSCM 8080 STD 95C FOR SHUTTLE AUDIO CABLES	GFE	STS 2&UP	152	2	V10
S15364	RMS WAIVER OF W0506 100% TEST OF ELEC WIRE	RMS	STS 2&UP	153	2	V10
S15404BR1	JSCM 8080 STD 152A LIQUID COMPOUNDS RESTRICTION AND CONTROLS OV-102, OV-103, OV-099	ORB	OV-102, OV-099, OV-103	185,186,187	2	V10
S15439R1	HAZARDOUS GAS DETECTION SYSTEM FOR LAUNCH PADS 39A AND 39B	L&L	MLP 1&2	188	1	V10
S15516	SAFETY FACTOR OF 1.491 FOR POWER REACTANT STORAGE ASSEMBLY (PRSA)	ORB	STS 1-8 (OV-099)	163		V10
S15685	WAIVE JSCM 8080 STD 95C FOR WCCU	GFE	STS 2&UP	154	2	V10
S15694	WAIVE JSCM 8080 STD 95C FOR SPOT METER BATTERY ASSEMBLIES	SRB	STS 2&UP	155	2	V10
S15702	JSCM 8080 STD 95C FOR HIGH RESOLUTION ACCELEROMETER GFE PACKAGE	GFE	STS 5&UP	189	3	V10
S15717	GOV SOURCE INSP REQ FOR WIRE AND CABLE PROCUREMENTS	ORB	STS 1&UP	190	3	V10
S15795E	WAIVE IMPLEMENTATION OF VLS FACILITY SEISMIC MODIFICATION FOR A70-0999 ORBITER SUPPORT STANDS UNTIL AFTER FVV	FVV	STS OV	274	2	V10
S15795F	WAIVER SEISMIC DESIGN REQUIREMENT FOR VLS PGHM (H70-0534V1)	FVV	STS OV	291	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S15795G	WAIVER TO GSE SEISMIC DESIGN RQTS FOR STS 51-O(OV)	FVV	STS OV	285	2	V10
S15795H	WAIVER TO GSE SEISMIC DESIGN RQTS FOR STS 52-O	ET	STS OV (ET 23)	288	2	V10
S15795J	WAIVER TO GSE SEISMIC DESIGN REQUIREMENTS FOR STS 62-A	GSE	STS 1V ONLY	292	2	V10
S15795KR1	WAIVER TO GSE SEISMIC DESIGN RQTS	ET	STS OV (ET 23&27)	293	2	V10
S15816D	DELETION OF QUALITY ASSURANCE RQTS FOR REFURBISHED HGDS SAMPLE BOTTLES	SS	STS 6&7	217	3	V10
S15841	MSC DESIGN AND PROCED STD 50 REV A EMU HELMET MOUNT COMBIN PURGE VALVE	GFE	STS 2&UP	164	2	V10
S15846	WAIVE JSCM 8080 STDS FOR INTERIM TELEPRINTER SYSTEM	GFE	STS 1-8	169,170,171, 172,173,174, 175,176,177, 178,179	2	V10
S15853R1	TIME ALLOWED FOR POST-LANDING COOLING PURGE	ORB	STS 2 ONLY	165,166		V10
S15892	CAMERA ASSY, DATA ACQUISITION BULKHEAD (S15892A)	ORB	STS 2-5	180	2	V10
H15910	WAIVE JSCM 8080 FLASHLIGHT AND PARACHUTE BEACON RADIO BATTERIES (S15911A)	GFE	STS 1-4 6 & SUBS	130	2	V10
H15911	WAIVE JSCM 8080 STD 116 PX-13 MERCURIC OXIDE BATT USED IN CREW COMPARTMENT 35MM CAM	GFE	STS 1-4	131	2	V10
H15924	WAIVE JSCM 8080 UNDERWATER LOCATING DEVICE BATTERIES	SRB	STS 1-4	132	2	V10
S15929	WAIVE MID-BODY STRENGTH LOW FACTOR OF SAFETY	ORB	STS 1 ONLY	133		V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S15929A	MID-BODY STRENGTH LOW FACTOR OF SAFETY	ORB	STS 2 ONLY	181		V10
S15929B	MID-BODY STRENGTH LOW FACTOR OF SAFETY	ORB	STS 3 ONLY	192		V10
H15929C	MID-BODY STRENGTH LOW FACTOR OF SAFETY	ORB	STS 5 ONLY	218	2	V10
S15929D	WAIVER REQUEST OV-102A 0017, REV. 7, MID-BODY STRENGTH LOW FACTOR OF SAFETY	ORB	STS 9 ONLY	244	2	V10
S15939	WAIVE SOLENOID CONTROL VALVE ATTACH FLANGE AT BURST PRESS OF 7500 PSIG (S15939A) (S21572)	ORB	OV-102 (STS 1-5) OV-099 (STS 6-8,10&13)	134		V10
S16569B	OV-102 CIL REQUIREMENTS (S05698)	ORB	OV-102	101	1	V10
S16569D	ORB CIL	ORB	STS 1 ONLY	101,102,103		V10
S16569E	ORB CIL	ORB	STS 1-4	101,102,103	1	V10
S16569ER1	ORB CIL	ORB	STS 1-4	101,102	1	V10
S16569F	ORB CIL	ORB	STS 1-4	102	1	V10
S16569GR1	ORB CIL (H05698E)	ORB	STS 1-4	101,102,103	1	V10
S16569JR1	ORB CIL (S05698F)	ORB	STS 1-4	102	1	V10
S16569LR1	ORB CIL (H05698H, H05698J)	ORB	STS 3&4	101,102,103	1	V10
S16569PR1	ORB CIL (H05698K)	ORB	STS 5 ONLY	101,102,103	1	V10
S16569TR1	ORBITER 102 CRITICAL ITEMS LIST (CIL) REQUIREMENTS	ORB	STS 4&5	101,102,103	1	V10
S16569VR1	ORB CIL (H05698M)	ORB	STS 5-9	101,102,103	1	V10
S16569WR1	ORB CIL (H16569Y, H16569Z, H26569)	ORB	STS 6,7,8, 10 & UP	228,229,230	1	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S16791	JSCM 8080, STD 133B DIELECTRIC TESTING OF ELECTRICAL WIRING	ORB	OV-102	51	2	V10
S20415R2	VAPOR PHASE COMPRESSION CYCLE FREEZER	ORB	STS 4 ONLY	193,194,195, 196,197,198	2	V10
S20415R3	JSCM 8080, STS 133B DIELECTRIC TESTING OF ELECTRICAL WIRING	ORB	STS 4 ONLY	204	2	V10
S20482LR3	DESIGN MODIFICATION TO LAUNCH FACILITIES TO ACCOMMODATE INCREASED FWC EXCURSION	L&L	MLPS	294	2	V10
S20711	REQUIREMENT FOR VAFB HYPERGOLIC MAINTENANCE AND CHECKOUT STATION FOR VAFB	SS	VLS 1&UP	199	3	V10
S20718	PROCEDURE AND SCHEDULE FOR RELOCATING LWT 100% FILL SENSORS	ET	LWT 1&2	121	1	V10
S20911	CIL/OMRSD (S20911A, S20911B, H20911C, S20911D)	ORB	STS 3-5 & 9	101,102,103	1	V10
H20982	NOISE LEVEL OF PLANT GROWTH UNIT EXPERIMENT	ORB	STS 3 ONLY	200		V10
S20987CR2	ET/ORB DISCONNECT PURGE SYSTEM SAFETY	ORB	STS 6-13	219,220	1	V10
S21173	FLUID PROCUREMENT AND USE CONTROL FOR COMPLIANCE WITH SE-S-0073C	ORB	PRIOR TO 9-15-81	205	3	V10
S21211	JSCM 8080 ACOUSTIC NOISE CRITERIA STD 145 FOR THE VPC FREEZER	ORB	STS 4 ONLY	201	2	V10
S21339	VAFB LAUNCH AND LANDING SITE (VLS) ACTIVATION OPTIMIZATION	GFE	VLS 1&UP	211,212,213	3	V10
S21799R1	JSCM 8080, STD 63 TO USE DISSIMILAR METAL COUPLES IN THE MMU AND FLIGHT SUPPORT STATION - P/NS 852MT002033 AND 852FT001130	SS	MMU 1-3 (STS 11&13)	221	3	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S22058	MMU/FSS ELECTRICAL WIRE ACCEPTANCE TEST WAIVER	SS	MMU 1-3 (STS 11&13)	222	3	V10
S22106R1	SRB CIL	SRB	STS 1&UP	136,137	1	V10
S22106AR1	ET CIL	ET	STS 2&UP	28,29	1	V10
S22106CR2	SRB CIL (H22106CR1)	SRB	STS 4&UP	214,215	1	V10
S22106DR1	SRB CIL (H22106D)	SRB	STS 1&UP	108	1	V10
S22106ER1	ET CIL (H22106E, H22106J)	ET	STS 5&UP	28,29,109,142	1	V10
H22106FR1	SSME CIL (H22106B)	SSME	STS 4&UP	53,54	1	V10
H22106HR1	ET CIL	ET	STS 4&UP	109,139,142	1	V10
H22106KR1	ET CIL	ET	STS 6&UP	138	1	V10
H22106LR2	SRB CIL (H22106M, H22106LR1)	SRB	STS 6&UP	30,31	1	V10
S22106NR1	ET CIL	ET	STS 6&UP	28,29,109, 139,142	1	V10
S22106PR1	SRB CIL	SRB	STS 7&UP	28,30,31,32, 64,65,66,108, 110,111,136, 137,214,215, 234,235	1	V10
S22106Q	ET CIL	ET	STS 13&UP	139	1	V10
S22330R1	WAIVER REQUEST HIRAP-EN-001, EMI, FOR STS-6, OV-099 AND STS-9, OV-102 (S22330)	GFE	OV-099 & OV-102	223	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S22487	SSME OPERATIONAL THRUST LEVEL	SSME	OV-099 (2012,2015, 2017)	50	2	V10
S22726	POST-LANDING T-0 PURGE TIMELINE (S22726A)	SS	STS 7&8	236,245	2	V10
S22728	DEVIATION TO DESIGN STANDARD 41A, JSCM 8080	ORB	STS 6&UP	224	2	V10
S22917	EMI SUSCEPTIBILITY FOR THE VERY LIGHTWEIGHT HEADSETS	GFE	STS 7&UP	225	2	V10
S23175	PSI BACK PRESSURE REQ	ET	STS 1 ONLY	123		V10
S23260	WAIVER REDUNDANT MSBLS FOR VLS-1 & VLS-2	GFE	STS 1V&2V	246	2	V10
S23446K	REQUEST FOR WAIVER TO PAYLOAD BAY CLEARANCE	ORB	STS 1V&UP	PRCBD	2	V10
S23568R1	OV-103 EEE PARTS TRACEABILITY REQUIREMENTS WAIVER FOR ROCKWELL EQUIPMENT (ORBITER WAIVER NO. OV103A00007)	ORB	STS 14 ONLY (OV-103)	256	2	V10
S23631	WAIVER REQUEST AGAINST JSCM 8080, STD 63, TO USE DISSIMILAR METAL COUPLES IN THE MMU/FSS	GFE	MMU 1&UP (STS 11&UP)	248	2	V10
S23632	REQUEST FOR WAIVER AGAINST JSCM 8080 STD 63, TO USE DISSIMILAR METAL COUPLES IN THE FLIGHT SUPPORT STATION	GFE	MMU 1&UP	247	2	V10
S23730R1	WAIVER REQUEST OV-099-0026, LOSS OF TRACEABILITY	ORB	STS 13&UP (OV-099)	271	1	V10
S23733	MMU-EXCEPTION TO 8080, STD 114A	GFE	MMU 1&UP (STS 11&UP)	252	2	V10
S23813R1	MMU/FSS CIL (S23813)	SS	MMU 1&UP (STS 11&UP)	254,255	1	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S26569AR1	ORB CIL (S26569B, S26569C, S26569D, S26569J, S26569K, S26569T)	ORB	STS 11&UP	228,229,230	1	V10
S26569G	ORB CIL	ORB	STS 9 ONLY	101,102,103	1	V10
S26569L	ORB CIL	ORB	STS 13&UP	228,229,230	1	V10
S26569M	ORB CIL	ORB	STS 13&UP	228,229,230	1	V10
S26569N	ORB CIL	ORB	STS 14&UP	228,229,230	1	V10
S26569P	ORB CIL	ORB	STS 14&UP	228,229,230	1	V10
S26569Q	ORBITER CRITICAL ITEMS LIST (OPERATIONAL CONFIGURATION) WAIVER	ORB	STS 20&UP	228,229,230	1	V10
S26569U	ORBITER CRITICAL ITEMS LIST (OPERATIONAL CONFIGURATION) WAIVER	ORB	STS 25&UP	228	1	V10
S26569V	ORBITER CRITICAL ITEMS LISTS (OPERATIONAL CONFIGURATION) WAIVER	ORB	STS 30&UP	229	2	V10
S27938	WAIVER OF WEB ACTION TIME OF THE SRB SEPARATION MOTORS	SRB	STS 1&UP	62	2	V10
S30009AR1	WAIVER REQUESTS FOR OV-099 & OV-103 UNDERSIZED WIRING	ORB	STS 24-27 30,33,1V&2V	287	2	V10
S30569A	KU-BAND RADAR ACTIVE MODE	ORB	STS 19&UP	286	2	V10
S30910	WAIVER OF FLUTTER - BUFFET CONSTRAINT IN MACH 1.25 - 1.4 REGION	ORB	STS 22&UP (OV-099)	PRCBD	2	V10
S31073	REQUEST FOR WAIVER FOR VLS CRITICALITY CATEGORY 1, 1S, 2 SINGLE POINT (SFP) CRITICAL ITEMS	GSE	STS 1V&UP (VLS)	295	1	V10
S31073D	VLS CRITICALITY CATEGORY 1S SINGLE FAILURE POINT CRITICAL ITEMS FOR THE FIRE DETECTION AND SUPPRESSION SYSTEM	VLS	STS 1V&UP	PRCBD	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S31073E	VLS CRITICALITY 1, 1S AND 2 SINGLE FAILURE POINT (SFP) CRITICAL ITEMS	VLS	STS 1V&UP	PRCBD	2	V10
S31073G	VLS CRITICALITY CATEGORY 1S SINGLE FAILURE POINT CRITICAL ITEMS FOR THE FIRE DETECTION AND SUPPRESSION SYSTEM	VLS	STS 1V&UP	PRCBD	2	V10
S31073H	VLS CRITICALITY 2 SINGLE FAILURE POINT CRITICAL ITEMS FOR THE ORBITER SERVICE PLATFORM (A70-0663-1)	VLS	STS 1V&UP	PRCBD	2	V10
S31285	HIGH INTENSITY SEARCHLIGHT - NON-CONFORMANCE OF CREW TOUCH TEMPERATURE	ORB	STS 19&UP	296	2	V10
S31664	VLS-MST 25 TON AUXILIARY HOIST CRITICAL SINGLE FAILURE POINTS	GSE	STS OV ONLY	297	2	V10
S31664A	VLS - SRSF (V31) 15 TON AUXILIARY HOIST CRITICAL SINGLE FAILURE POINT	GSE	STS 1V ONLY	312	1	V10
S31664E	VLS-MST 25 TON AUXILIARY HOIST CRITICAL SINGLE FAILURE POINTS	GSE	STS 1V ONLY	330	2	V10
S32051	WAIVER REQUEST FOR STS 51-B (SPACELAB 3) NEON DOWNWEIGHT	SS	STS 24 ONLY (OV-099)	298	2	V10
S32069B	WAIVER REQUEST FOR FIXED PLATFORM LOAD CAPABILITY FOR VLS	VLS	STS 1V&UP	314,315	2	V10
S32069C	WAIVER REQUEST FOR PAYLOAD EQUIPMENT SIZE FOR VLS PCR	VLS	STS 1V&UP	316,317	2	V10
S32181A	WAIVER REQUEST FOR STS 51-F (SPACELAB 2) NEON DOWNWEIGHT	SS	STS 26 (OV-099)	313	2	V10
S32619	DELETE REQUIREMENT FOR METAL PROTECTIVE CAPS ON DFI DISTRIBUTOR	SRB	STS 26 ONLY (OV-099)	311	2	V10
S32877Q	WAIVER FOR SRB DEBRIS	SRB	STS 1&UP	104	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S32877Z	ET ICE/DEBRIS WAIVER	ET	STS 1 ONLY	74		V10
S32945R1	WAIVER REQUEST FOR STS 61-A (SPACELAB-D1) NEOM DOWNWEIGHT	ORB	STS 30 ONLY	326	2	V10
S33084	WAIVER REQUEST FOR STS 61-C NEOM DOWNWEIGHT	ORB	STS 32 ONLY (OV-102)	PRCBD	2	V10
S33205	WAIVER REQUEST FOR STS 51-L ABORT DOWNWEIGHT	ORB	STS 33 ONLY	327	1	V10
S33205A	WAIVER REQUEST FOR STS 51-L ABORT DOWNWEIGHT	ORB	STS 33 ONLY	PRCBD	1	V10
S33259AR1	WAIVER REQUEST FOR STS 61-E NEOM DOWNWEIGHT	ORB	STS 34 ONLY (OV-102)	328	2	V10
S36604	DEVIATION REQUEST FOR FLOW INDUCED VIBRATION ANALYSIS OMS LOW PRESSURE SOLENOID VALVE	ORB	STS 1&UP	83	2	V10
S36687	DEVIATION TO MIL-H-5440F BURST PRESSURE REQT FOR TVC SERVOACTUATOR TO 200%	ORB	STS 1-4	84	2	V10
S36889A	WAIVER FOR APU DRIVEN MAIN HYD PUMP	ORB	STS 1 ONLY	105		V10
S36889B	WAIVER TO INCREASE ALLOWABLE APU DRIVEN PUMP RIPPLE	ORB	STS 1&2	105		V10
S36889CR2	INCREASE ALLOWABLE APU DRIVEN PUMP RIPPLE	ORB	STS 1-5	105	2	V10
S36889G	INCREASE IN ALLOWABLE MAIN PUMP RIPPLE	ORB	STS 6&UP	4	2	V10
S36896R1	WAIVE TRACEABILITY REQUIREMENT FOR INSTALLED HARDWARE	ORB	STS 1-4	143	1	V10
S37772	SRB TVC SYS TUBE ASSEMBLIES WAIVER REQUEST	SRB	STS 1 ONLY	68		V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S42877A	ORBITER DEBRIS WAIVER	ET	STS 1 ONLY	135		V10
S42877B	ICE/DEBRIS (S42877F) (S42877I)	ET	HWT 2-4	148	1	V10
S42877P	ICE/DEBRIS	ET	LWT 1&UP	202		V10
S42877T	ICE/DEBRIS	ET	STS 3 ONLY	148		V10
H42877U	ET/ORB UMB LEAK CHECK PORTS ICE DEBRIS	SS	STS 3 ONLY	203		V10
S46360	SERVO ACCELEROMETER, DATA CONTROL MODULE 303B, HERMETICALLY SEALED (H46360A)	ORB	STS 2-5	167	2	V10
S46361	HIGH INTENSITY MICROPHONE OUTLINE (H46360A)	ORB	STS 2-5	168	2	V10
S46553	MRCC WAIVER RFD/W NO. 102 MECHANICAL ARM WIRING	RMS	RMS	226	3	V10
S47114	WAIVER OF REQUIREMENT TO PRESSURIZE BSMS	SRB	STS 1-8	75	2	V10
S47114A	WAIVER TO SEAL SRMS FROM MOISTURE INTRUSION JSCM 8080	SRB	STS 1-8	106	2	V10
S52877R1	KSC FOAM CLOSEOUT ON THE ET TSE DIAGONAL STRUT ATTACH FITTING (21300A, S52877D, S52877J, S77340)	ET	STS 4&UP	148	2	V10
S52877H	ICE/DEBRIS WAIVER FOR LIGHTWEIGHT TANK	ET	LWT 1&UP	148	1	V10
S57893B	UPDATE JSC 07700 TO REFLECT CURRENT HPM SRM NOMINAL PREDICTION LIMITS, IMPULSE GATES AND NOMINAL PERFORMANCE TIME HISTORY	SRB	STS 22&UP	299,300,301	2	V10

APPROVED LEVEL II DEVIATIONS/WAIVERS

JSC 07700, VOLUME X

PRCBD NO.	TITLE	IMPACT	EFFECT	WAIVER NO.	CAT	ID.
S66319R1	WAIVER REQUEST OV-104-0011 LOSS OF TRACEABILITY	ORB	STS 28&UP	331	2	V10
S66499	SEADS (SHUTTLE ENTRY AIR DATA SYSTEM) CIL (CRITICAL ITEMS LIST) REQUIREMENTS WAIVER	ORB	OV-102	PRCBD	2	V10
S67139	"MARKING FOR SHIPMENT" (CIVIL AGENCIES) IN ALL NASA DOCUMENTATION	SRB	STS 7&UP	206	3	V10
S67217R1	SRB/ET-RSCD CIL C/N NO. 6	SS	STS 2-6	183	1	V10
S77340A	ELIMINATION OF TWO ET/SRB UPPER AFT STRUT BAGGIES FOR STS-6	ET	LWT-1	148	3	V10
S77340B	ELIMINATION OF ET/SRB AFT ATTACH STRUT BAGGIES	ET	HWT-6	148	3	V10
S77517	ROUTING OF ORDNANCE CABLES X31W5R AND X31W10R	SRB	STS 5&6	227	3	V10
S87040	TPS THICKNESS OF FOAM CLOSEOUT (ET-10 AND SUBS)	ET	STS 9&UP	237	1	V10
S90812	REQUEST WAIVER FOR THE ICE/FROST PROTECTION RQT AT THE CUT-OUT WHERE THE LO2 CABLE TRAY I/F WITH THE TORQUE MULTIPLIER	ET	STS 23&UP	PRCBD	2	V10
S91411	MOTOR SET 330L22 THRUST IMBALANCE	SRB	STS 30 ONLY	329	2	V10
S97343	STS-13A & STS-13B SOLID ROCKET MOTORS	SRB	STS 13 ONLY	PRCBD	2	V10
S97794	REVISE SPECIFICATION TO SPECIFY USE OF CLASS 2 THREADS FOR STANDARD CONNECTOR	ET	STS 14&UP (ET 14&UP)	275	2	V10

REDIRECTION OF MAJOR MISSIONS

Senator PROXMIRE. Dr. Fletcher, you, in your prepared statement, referred to the fact that the tragic *Challenger* accident was causing you to redirect efforts previously planned for major missions such as the Space Telescope and Galileo.

Dr. FLETCHER. Yes.

Senator PROXMIRE. How about the proposed space station? Shouldn't this be put on the back burner until the shuttle is operational once more?

Dr. FLETCHER. Senator Proxmire, I have looked at that question in some depth in the short time that I have been aboard.

It is certainly true that the space station depends on the space shuttle, but it is far enough down the road so that we can't see any reason to delay the space station because of the accident.

I have to quickly add that you can't have a space station without an adequate space transportation system. So the two do go together.

Putting that altogether, I think it would be a tragic mistake to delay the date.

STATUS OF SPACE STATION

Senator PROXMIRE. How far down the road is the space station?

Dr. FLETCHER. I think that the correct answer will have to be given by Dr. Graham. I think we are in the middle of phase B. We expect to finish phase B in something like December of this year. So we are pretty far along in the planning. We are not far enough along so that we can give you a precise cost estimate. We can assure you that the 1994 date though is still valid.

Senator PROXMIRE. Dr. Graham.

Dr. GRAHAM. Senator Proxmire, in our 1987 budget submission to the Congress we propose to go into the full-scale development of the station in 1987. This will be working toward a first-component launch to orbit of the space station in late 1992. We would have a capability of permanent manned presence in space within 1994, sir. Then to continue assembly of the base line space station for about another year and a half. This is at a rate of approximately one launch every 45 days to 2 months during the assembly phase.

Senator PROXMIRE. My time is up, Mr. Chairman.

Thank you, Dr. Fletcher and Dr. Graham.

Senator GARN. Senator Leahy, do you have any additional questions?

SHUTTLE AS PART OF SDI

Senator LEAHY. Only one, if I might, Mr. Chairman.

I once remarked in my capacity as the vice chairman of the Intelligence Committee that instead of having our normal classified briefing, that we have the Post and the New York Times marked top secret and sent to us each morning. This would have three advantages. We would get the intelligence material much quicker that way. Second, we would get it in far greater detail than from any classified briefings up here. Third, we would get an extra crossword puzzle.

In the paper this morning, the Washington Post, the place where most of us get our briefings on confidential administration plans, makes a strong suggestion that the United States may boost shuttle's military role. To go back to my earlier question, will the Star Wars or the SDI experiments require the shuttle and, may they well be the reason for the shuttle. Is that true?

Dr. FLETCHER. Senator Leahy——

Senator LEAHY. Are we asked to build the shuttle as part of SDI?

Dr. FLETCHER. Senator Leahy, I was involved briefly in the SDI program. I know a little bit about the program. I can assure you that the shuttle was not designed to be part of the SDI.

Now having said that, however, the shuttle was designed as a transportation system for all users—military, commercial, and scientific. That was stated many times before this committee and to the public.

To the extent that Star Wars needs to use it—and Star Wars is your expression and SDI is ours—to the extent that the program needs to use the shuttle, they will make their needs known.

Senator LEAHY. I am happy to use either one. It makes no difference to me.

Dr. FLETCHER. They will make their needs known.

I believe that there are some missions that are programmed in the future that are not decided yet, just the exact manifests as to when they will occur in the sequence. They have not been decided yet.

Now we will certainly accommodate them on an appropriate priority basis.

Senator LEAHY. You understand that I have no problem with the shuttle being used to carry military payloads. As I said earlier, I expect them to be using it more and more. I just don't want NASA, as envisioned by the Shuttle, to become a subsidiary of the Air Force.

Dr. FLETCHER. Senator Leahy, while I am the Administrator of NASA that will not happen. Of course, they can always let me go I suppose.

Senator LEAHY. We all, in one way or the other, face that possibility.

Thank you, Dr. Fletcher.

Thank you, Mr. Chairman.

CHAIRMAN GARN'S CLOSING REMARKS

Senator GARN. Thank you, Senator.

I have no further questions. I would like to close with a statement to try to bring things into perspective.

There is no doubt that we have suffered a great tragedy. Everybody knows what took place. Certainly no one could feel more personally touched by it than I because the seven who lost their lives were my friends.

FUTURE OF THE SPACE PROGRAM

At the same time, Dr. Fletcher, I have been very disturbed by what I think has been an incredible overreaction by some members of the press and some of my colleagues, fortunately not on this subcommittee.

I appreciate Senator Leahy's role as ranking minority member and the way that he has approached it in a very factual and practical manner asking questions which deserve answers. I do appreciate his support in that way.

This is disturbing to me because of the additional damage that I believe has been done to the agency, to morale, to the personnel within the agency, which is far beyond the tragedy itself. I am also aware that every time I make this statement there will be stories about how Jake Garn has been bought by NASA because I flew. I've flown; it's over. I don't expect to go again, so I don't have to do that.

What is at stake here and what I have been trying to defend for the last few months and to put into perspective is not NASA. It's the future of the space program of this country. It has nothing to do with people who are currently there. If we could somehow get some focus and some perspective on this whole matter when we get into the discussion on cost. Now I can remember a long time ago when you were the Administrator and I was a brand new freshman Senator in another building over in the Russell Building when I was a very junior member of the Space Committee. This is when we still put enough emphasis on space that we had a separate authorizing committee. It did not then become a subcommittee of the Commerce Committee. This shows you some idea of the relative importance Congress placed on it after the glamor days of Apollo.

OVERALL INCREASES IN COST

As you were testifying in favor of your budget, I think it was back in 1975 for the fiscal 1976 budget year when the entire budget request of President Ford was $295 billion, and I believe that year we appropriated $318 billion. In that relatively brief period of time the Federal budget for the next year would be $1 trillion, or almost a full fourfold increase.

When I look at stories like the New York Times did, I don't know why they don't run that on any agency. They could show the same missed estimates about what costs would be. I doubt if anybody would have predicted a $1 trillion budget or a $200 billion deficit each year in the years that we are dealing with or a Congress that cannot pass a budget and who passes giant continuing resolutions.

Again, I am not saying that NASA isn't subject to some criticism or that the facts printed in some of these stories are not correct; they are. We could apply them to a lot of agencies. Food stamps have increased far beyond that. The HHS budget has increased beyond that. The military budget has increased beyond that, and all the way through. It is just a gigantic increase of expenditures and deficits in this country. So NASA is not alone in that. Every agency in the Federal Government is involved.

We made a promise to you in that hearing. I remember it very clearly. The chairman at that time, the senior Senator from Utah, Frank Moss, said, and the committee agreed, that we would keep NASA whole for inflation. We have not done that.

I have asked the staff to give me a record of administration requests for three different administrations over those years as to what was actually appropriated and to put it in 1-year dollars. I don't care whether it is 1986 dollars or 1971 dollars. Maybe somebody will print that factual record as well as what the purchasing power has done, why we canceled the Apollo missions, why we didn't have a probe up to watch Halley's comet. That was a terrible embarrassment to me that we had to send our scientists over to the Soviet Union to cooperate with them in their probe and with other nations. We couldn't afford to study Halley's comet.

So with all the criticism that is being dumped on NASA it is time that we started looking at the other side of the coin and the funding levels and requests that were denied by a Congress that had other priorities and wasn't willing to look at spinoffs from space.

RECOVERY COST

This gets me to another point. I do believe that NASA was misleading, not intentionally, but was a great deal pressured by Congress into cost recovery. I can remember those hearings, too. We were talking about making certain that we had the full cost recovery. I have seen enough people intimidated from this on Banking Committee's hearings over the years; also all sorts of areas. We push, we shove, and we create self-fulfilling prophesies. So there is a lot of push from Congress, and still is, for some who still say that whatever the cost is of the launching of a shuttle or deploying it into space that we ought to charge the full price for it.

I have never believed that. I have always felt that the shuttle could be justified on the basis of science. What is done on the middeck. When Charlie Walker, McDonnell Douglas, or someone else comes up with a cure for a major disease as a result of processing pharmaceuticals we will have recovered each dime ever spent in space flight for the benefits of the lives saved and people that live a lot longer. That is something else that we need to do for the record, too. Put out a total list of the spinoffs that have come and balance that against the cost of what the taxpayers paid.

So what I am stating is that the cost to the taxpayers may not be able to be justified. In fact, it cannot be justified in terms of saying that we are going to get $7.5 billion a year back from launching commercial satellites. You can total up, I bet, hundreds of millions, if not billions of dollars, as representing the value of the products that we use every day that are spinoffs of the space program. This is without trying to quantify what the value of a human life is, the pacemaker and things of that nature. I think you would find out that our investment in the space program is probably the most beneficial investment we ever made and you would wish that we had spent more to increase what we learned in space.

SPACE STATION DELAY

That is my problem with this administration. It recommends a delay in the space station for short term cost recoveries to make the budget look better this year. All this will guarantee is some future administrator sitting there defending in 1992 or 1993 why everybody misled them on the cost of the space station now. That will happen. I won't be here. You won't be here. Some poor devils are going to be here going through the same damn conversation of why in 1986 did you mislead the Congress on the cost of a space station. I hope the administration is not foolish enough to fall into that trap, nor the Congress, because maybe I will come back in the private sector one of those days to ask to be a witness. I will say, "Look, I was there. I was part of what you did. You can't have it both ways. You can't complain about those increased costs in the middle 1990's because you delayed this in the middle 1980's." That old slippage is a game we play all the time. Nobody ever seems to catch onto it. The taxpayers ought to, of how you save on the budget, reduce it a little bit in the 1987 budget year and hope that you are not there when it finally bears fruit and it all comes out. Somehow some other side of the story has got to be told. That is all that I have been trying to do. I don't defend NASA blindly.

As a matter of fact there is only one reporter in the whole group that took up my challenge a few months ago to look at the record since I've been chairman and look at all of the disputes I have had with NASA, money that they asked for that sometimes I denied.

MANNED SPACE AND ROBOTICS

NASA was not very happy last year when Chairman Boland and I ordered an additional study of the space station on the balance between manned space and robotics because we didn't think NASA's plan went enough into robotics in pushing the frontiers of robotics and was relying too much on man. So we withheld funding for the space station phase B studies and said, "You are not going to initiate your phase B contracts until you perform the space station automation and robotics studies that we want." I think that the record is very clear. That will continue. We will continue questioning NASA very hard on the specifics and the individual items.

That is a different story, that kind of tough oversight compared to being in favor of an overall space program to bring so many benefits back.

CRITICISM OF THE PRESS

I don't intend to be intimidated by the press. They can say I'm bought, that I'm cozy, all of those things all day that they want. I really don't care. They can dish it out. They ought to learn to take it once in a while as well and start looking at the record and doing their homework a little bit better. I frankly would be ashamed to do my job as poorly as some of them have done over the last 3 months. When you pick up a story—and I plead guilty maybe to knowing too much about NASA, having been part of a crew and all of that—but the stories just aren't correct. It has nothing to do with bias, nothing to do with anything but sloppy research. It is not looking into what is going on and printing stupid stories as a result of not taking the time to get the facts.

I just wanted it all on the record of where I am coming from. I'll defend the U.S. space program. I'll defend keeping us ahead of the Russians in peaceful space. I'll defend all the spinoffs that will come from space exploration and development. I'll try to get a higher overall budget for NASA, not for just NASA, for the future of the country and all the spinoffs and all the things we will enjoy from it.

On the other hand, NASA is going to get asked some tough questions about individual items. We hold back funding when required, as I have done in the past.

I appreciate the fact that you have only been on board for 3 days. I think you have done extremely well for only being back 3 days and being in your second or your third hearing already. Maybe we will give you some time to do your homework, at least for a while, before we call you back for a full-blown hearing if the administration ever decides to make up their minds on what they want to do with the fourth orbiter.

I appreciate all of you being here today. We will continue to do what we can.

I haven't forgotten Senator D'Amato. I'm getting poked. It is impossible to forget Senator D'Amato.

REMARKS OF SENATOR D'AMATO

Senator D'AMATO. Thank you, Mr. Chairman.

Let me congratulate you for calling this hearing. Also, Mr. Chairman, let me tell you that I am pleased and delighted as you are to welcome Dr. Fletcher back as the Administrator of NASA.

Mr. Chairman, I agree that NASA must be able to maintain readiness and production capabilities for the replacement orbiter contingent upon the ultimate recommendations of the Presidential Commission on the *Challenger.*

In order to do this, there are a variety of activities that we must continue, and there are others that have to be initiated if they are going to be ready.

Some of these actions we need to consider seriously include progress toward restoration of a three-shuttle orbiter fleet and the cost effectiveness and the timely replacement of the *Challenger* when that decision is made by the Congress.

Mr. Chairman, it is also important to focus in on the strategic importance as to the program and its relationship, its integral relationship, with our intelligence community. We must redouble our efforts to see to it that this Nation has the best capability possible to provide for the security for this Nation and for peace.

I don't intend to go into any kind of details, because I know that in the future we will have meetings with Dr. Fletcher in closed hearings. But we cannot underestimate the importance of the interrelationship that exists between NASA and our intelligence-gathering capabilities.

Mr. Chairman, I look forward to supporting your efforts strongly during these difficult times, and I will say to some of those who recently have been critical of NASA's that we must not lose sight of their importance. NASA's work is important, not only to the future economic growth and development of the Nation, but also in terms of the capabilities that are so essential to the domestic security and international security that comes about as a result of its programs.

Thank you, Mr. Chairman.

COMMERCIAL VERSUS SCIENTIFIC VERSUS MILITARY CARGO

Senator GARN. Thank you, Senator D'Amato.

You have reminded me of just one more thing that I think is also important for the record.

There is a great tendency in this argument over the commercial versus scientific versus military cargo on the shuttle and to somehow put military in a negative context. I think that people should be very well aware of what the military cargo is.

First of all, to those who seek arms control with the Soviet Union—and I am one of those—it is absolutely necessary regardless of what kind of a treaty we eventually sign, hopefully fair and favorable to both sides, that we have the ability to verify it. The primary means of verifying any arms control treaty is national technical means or, in layman's terms, spy satellites. It is necessary to have these satellites. They do not harm anybody as they have no offensive or no defensive capability in the sense that we put a military connotation on them. They are up there to look.

The other military satellites that we put up are communications satellites, navigation satellites. So the sole purpose of all this military cargo that are talked about are either intelligence, improving communications around the world and improving navigation capabilities. They are neither a threat, an offensive weapon, or a defensive weapon. In the military context they don't exist in that fashion. Many of them are not too much different than civilian communication and navigation satellites that we deploy for the use of the commercial airliners to navigate by, commercial ships, and almost everybody has the availability to use these types of satellites.

Having said that, I agree with you completely, Dr. Fletcher, that there are many of us who will back you up when we say that not only will the Air Force not take over NASA, but the Air Force, as long as I'm around, will not create their own space agency. I say that as a retired Air Force officer.

There is a tendency for the military services to like to have their own little toys. I am hopeful that Senator Goldwater's reorganization will eliminate some of those interservice turf battles that have gone on between the Army, Navy, Air Force, and Marines and so on. That is why there has been an argument over the years beyond the ELV's and shuttles as to the matter of whether the Air Force has its own little ball game or not. I can't emphasize enough how important it is to me that

NASA remain a civilian space agency and the overwhelmingly primary space agency in this country, that it not be run by the military.

I agree with your statement and I will do everything that I can to make certain in response to Senator Leahy's question that we will certainly deploy the military type satellites that I have outlined because of their importance to the national security of this country. But NASA will be the lead agency as long as I have anything to do with it. The Army, Air Force, or Navy are not going to create their own little empires in space. We will keep it a civilian-run agency.

SUBCOMMITTEE RECESS

Gentlemen, thank you for coming today. The subcommittee will stand in recess subject to the call of the Chair.

[Whereupon, at 11:30 a.m. Thursday, May 15, the subcommittee was recessed to reconvene at the call of the Chair.]

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DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987

TUESDAY, SEPTEMBER 16, 1986

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10 p.m. in room SD–192, Dirksen Senate Office Building, Hon. Paul Laxalt presiding.

Present: Senators Laxalt and Leahy.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

STATEMENT OF DR. JAMES C. FLETCHER, ADMINISTRATOR

ACCOMPANIED BY:
ADM. RICHARD TRULY
C. THOMAS NEWMAN

OPENING REMARKS

Senator LAXALT. The subcommittee will be in order.

Dr. Fletcher, it is a pleasure to welcome you before our subcommittee to present your agency's revised budget request for fiscal year 1987.

I need not point out the unusual circumstances which find me acting on behalf of Senator Garn, nor why we find ourselves conducting a hearing on your budget on the eve of the start of the fiscal year.

It is, nevertheless, important to acknowledge the significance of the issues currently confronting Congress in determining the future of our national space program, especially the large budgetary aspects of this question and the long-term implications of the decisions we all face.

At the risk of further disquieting those listening to these remarks, allow me to add that the congressional budget schedule appears to make necessary committee action on the NASA budget and the budgets of the other agencies under the jurisdiction of this subcommittee within the next week. That is a rather momentous challenge, to say the least.

For this reason, Senator Garn has asked me, during his hospitalization, to act in his stead, to proceed, if possible, with our subcommittee's consideration of the fiscal year 1987 HUD and Independent Agencies appropriations bill. To this end, I have tentatively scheduled markup of the bill this Thursday and seek the cooperation and assistance of all members to make this possible.

Dr. Fletcher, one of the largest issues confronting our subcommittee is how we are able to restore and revitalize our national space program. I hope your testimony today will assist us in delineating a successful strategy to achieve this very critical goal.

On behalf of Senator Garn, and the members of the subcommittee, I welcome you to our hearing.

PREPARED STATEMENT

I don't see any other members here. Senator D'Amato, although he could not be here, has provided us with a statement. I will ask that it be included in the record at this point.

[The statement follows:]

STATEMENT OF SENATOR D'AMATO

Mr. Chairman, I am pleased to join you for this hearing on the fiscal year 1987 budget for the National Aeronautics and Space Administration.

The budget request, along with its necessary revisions, will assist in the initiation of procurement for a replacement orbiter and inertial upper-stage airborne support equipment. America's commitment to these and other programs of the National Aeronautics and Space Administration will enhance America's strength and prosperity. We must continue our strong commitment to its development so that we stand ready for future scientific and technological developments.

Mr. Chairman, I am pleased to know that this budget includes $94 million to augment activities directed toward resolution of space shuttle system anomalies and to respond to recommendations of the Rogers Commission.

The fiscal year 1987 initiatives for the Space Station is noteworthy for it clearly signals to our international partners that the U.S. commitment is firm. It also shows the private sector that future investments in commercial space activities are under serious consideration.

Mr. Chairman, the fiscal year 1987 budget which includes funds for a replacement orbiter and the initiation of development of the Space Station strengthens our commitment to U.S. leadership in space. These programs of NASA make America stronger and more prosperous both scientifically and technologically.

Thank you, Mr. Chairman.

Senator LAXALT. We will defer any other opening statements, and you may proceed, Dr. Fletcher in any manner that you wish.

DR. FLETCHER OPENING STATEMENT

Dr. FLETCHER. Mr. Chairman, I am glad to be back here. Probably you are as surprised to see me back at NASA testifying on budget, as I am to see you as chairman.

Senator LAXALT. We go back a long way.

Dr. FLETCHER. I must say that the reason I agreed to come back is because of what you have said earlier. It is vitally important that we restore the space program to its former brilliance. The space program is important, and it does mirror the way that we Americans see ourselves and the rest of the world sees us. If you would permit me, I would like to submit my statement for the record, and I will just try to summarize it briefly.

Senator LAXALT. That would be very acceptable.

NASA ORGANIZATION AND INSTITUTIONS

Dr. FLETCHER. A strong space program not only sparks economic growth at home, but signals the world that Americans are ready to lead the free world on to the space frontier. The fiscal year 1987 budget that you have before you, the amended fiscal year 1987 budget, is a good starting point to help the United States enjoy that leadership in space. It is not the whole program, but it is a good beginning.

"CHALLENGER" ACCIDENT

Before I discuss the budget itself, I would like to briefly mention the progress that we have made in stabilizing the NASA organization and institution since the *Challenger* accident. The accident itself, as you know, caused a terrible shock to the very foundation of NASA because of the adverse publicity and the penetrating investigation that followed the accident by the Rogers Commission. It had a really large and significant impact on the NASA confidence and morale.

I feel that the NASA institution is recovering reasonably rapidly with several new people that we have filling key positions, some of whom are here today. Over the past several months, since I have been here, we have appointed two new center directors. At the Kennedy Space Center, Gen. Forrest McCartney is almost in place and at the Marshall Space Flight Center, we have J.R. Thompson, who is in place. At headquarters, we have brought back from being the center director at Lewis, Mr. Andy Stofan to head the Space Station Program.

Admiral Truly came in just before I did to head the Space Transportation Program, the largest piece of which is the shuttle. George Rodney came in to head our newly created Safety, Reliability and Quality Assurance Office. George was planning to be here but I suspect that he had a last minute change of plans. Capt. Rick Hauck, who has flown twice on the shuttle program already, has come to headquarters to coordinate our Office of External Affairs. Soon, hopefully by next week, we will have Dale Myers as my deputy. His hearings are scheduled for Monday at 2:30.

Dick Truly is here with me at the table, as well as Tommy Newman, who is familiar to you from days of old.

In the 4 months since returning to NASA I visited people throughout several of the centers, and I believe that morale is beginning to build, and the "can do" attitude that NASA has had in the past is beginning to return.

TASK FORCES APPOINTED

We have set up task forces to review a number of issues. The solid rocket motor seals, the main cause of the accident, is being reviewed by an external group from the National Academy of Sciences. The list of the critical items that we feel need to be fixed before we fly again is being reviewed by another committee of the National Academy of Sciences. The shuttle flight rates, how fast we should be flying shuttles in the future, and an orderly way to get back on track, are also being reviewed by another committee of the National Academy of Sciences.

We have an internal review of how we should operate expendable launch vehicles in conjunction with the shuttle, to be able to handle all of the payloads that are not able to be launched during this down period of the shuttle. There will be a fair amount of backlog that has to be worked off using expendable launch vehicles.

The shuttle procedures and communications are being examined by another committee. Capt. Bob Crippen is heading that activity. Last but not least, we have asked Gen. Sam Phillips to come back. Sam was the program manager for the Apollo Program, as you know, a very successful program in which we landed six pairs of astronauts on the Moon. He is coming back as a consultant to review NASA's overall management system, particularly our program management system, and we hope to have that review finished by the end of this calendar year.

So we have made some progress, Mr. Chairman, during the 4 months, and it has been kind of a fast track, but I think we are making headway.

NASA FISCAL YEAR 1987 AMENDED BUDGET REQUEST

Of course, the purpose for being here today is to present the President's amended budget request for fiscal year 1987. Just a few words about that request, what it contains. The amount is $7.966 billion, which includes $250 million for a start on the replacement orbiter. It includes some additional funds for the anomaly fixes, as we call it, to fix the shuttle, and also for implementation of the Rogers Commission's recommendations. There is a large number of recommendations that came out of that Commission, and this is going to require additional funds to address all of these recommendations.

It also consists of about $800 million of reductions because of the 2-year hiatus that we are exhibiting, and we needed that $800 million to pay for some of these other things that we are trying to do to maintain the momentum of the program the best we can.

REPLACEMENT ORBITER

I would like to comment on the problem of the shuttle orbiter, the replacement orbiter. The Defense Appropriations Subcommittee has provided $2.96 billion in their fiscal year 1987 budget to provide for the entire funds for the replacement orbiter. Therefore, it is an appealing long-term option if we can properly deal with the fiscal year 1987 funding problems which this would create.

SHUTTLE REIMBURSEMENTS

I would say the main problem in the fiscal year 1987 funding is the requirement for $531 million in shuttle reimbursements that the Defense Department has committed to us for flights for which we had to start preparing. That $531 million is important as a part of our funding for fiscal year 1987.

If they are not available from the Defense Department, I would hope that they would be replaced by some other sources such as your subcommittee, Mr. Chairman. Whatever is the case, that $531 million is awfully important to get the shuttle flying again in the first quarter of fiscal year

SPACE STATION

In addition, there are a number of programs, which although delayed, are necessary to continue on track the best we can to keep the momentum going for a vital, invigorated space program.

First, but not delayed, is the Space Station, which was recommended by the President in 1984 in the State of the Union Message. This year's budget includes $410 million for the Space Station, and it is awfully important that we make a start on that Space Station.

We have international commitments which expect us to start this year. We have a number of contractors that are expecting to compete for various portions of the Space Station this year. Last but not least, President Reagan reaffirmed his support in the August 15 announcement on the replacement orbiter. That is an important part of the fiscal year 1987 budget.

SPACE SCIENCE BUDGET REQUEST

We also have a number of programs in the budget that have to do with planetary and scientific missions. TOPEX, as we call it, is an ocean topographical experiment. That is, we are trying to measure the apparent height of the ocean, and that gives us a sense of the out-of-roundness of the Earth, if you like. This is a program which is a continuation of the SEASAT Program, which we launched, I think, in 1978, and it is a cooperative program with the French. They are expecting us to go ahead with the TOPEX Program as an important new start in fiscal year 1987.

We had a number of problems, Mr. Chairman, because, in reviewing the safety of the shuttle, we had, as an upper-stage, a program called Centaur, which was a liquid hydrogen upper stage. We got a little worried about the safety of the shuttle with that kind of cryogenic upper stage. We took the bull by the horns and simply cancelled the Centaur Program, which left three planetary missions sort of hanging dry, so to speak.

The Galileo Program, which is a program to go to Jupiter and there launch a probe down through Jupiter's atmosphere, while an orbiter circles through Jupiter's orbit and its satellites. It has 10 or 12 satellites. We keep adding to the satellites as we find new small ones.

Ulysses was another program, which was planned to be launched by the Centaur, a program to move out of the plane of the ecliptic. That is, we plan to get a gravity assist from Jupiter, which sounds a little wild, and go over the solar north pole, out of the ecliptic, way above the plane in which the planets move. That would have used the Centaur. Then there is the Magellan, a program to orbit the planet Venus which also uses the Centaur upper stage. We are studying options for dealing with these, and money is available, for the moment anyway, in the fiscal year 1987 budget to appropriately accommodate these on the shuttle at some later date.

We have a space telescope, which is still in the program, which I don't have to talk about since it is an older program. It is, nevertheless, a crucial program to advance astronomy for the next several decades. We have a Gamma-Ray Observatory, which is similar to the space telescope, but for studying gamma rays. We also have an Upper Atmospheric Research Satellite, a Mars observer, and many Spacelab flights that are all included in the space science budget.

AERONAUTICS BUDGET REQUEST

As far as aeronautics is concerned, Mr. Chairman, there are a number of what we call high payoff technology areas. NASA has always been a world leader in new technology in aeronautics, and this year's budget is no exception. Worth mentioning is a recently completed numerical aerodynamic simulation device, NAS, as we call it.

It is a computer substitute for a wind tunnel. The wind tunnel people don't like me to use the word "substitute." They like to say augmentation. But we can actually do experiments using this computer that we used to do in wind tunnels, and we can get results and change the wind tunnel or a like object very quickly. We have some very interesting results already from that simulator.

In addition to that, we are working with the Defense Department, Mr. Chairman, on the President's National Aero-Space Plane. The President announced this in the January 18, 1986, budget, and we are busy working with the Defense Department. We are supplying most of the technology for that plane, and the Defense Department the program management. This is partly an aircraft that will fly, as the President said, to Tokyo in 2 hours or less, or an airplane that will fly a little faster and make it to orbit as an option for transporting people to and from space.

CONCLUDING STATEMENT

That is kind of a quick once-over as to what is in the budget. I just would like to conclude by again emphasizing what you indicated at the beginning. This budget is an essential element for rebuilding our Nation's space program and strengthening our capabilities to operate in space effectively and efficiently. If we are to maintain our leadership in space in the future, it is vital that NASA gets the resources and the support required to do the job.

Mr. Chairman, the U.S. leadership in space never could, and never should be, taken for granted. The Soviet Union remains our principal competitor, and around the world other nations are building impressive space capabilities. Our space program is at a critical turning point this year. If we fail to provide the support it needs to regain its momentum, others could and will pass us by.

Mr. Chairman, that concludes my remarks.

[The statement follows:]

STATEMENT OF DR. JAMES C. FLETCHER

I am pleased to appear before you today to present President Reagan's FY 1987 budget request for NASA which was transmitted to the Congress on February 5, 1986, and to discuss revisions which are necessary as a result of the Challenger accident. The original NASA FY 1987 request is for $7.7 billion, of which $3.0 billion is for Research and Development, $3.1 billion for Space Flight, Control and Data Communications, $181 million for Construction of Facilities, and $1.4 billion for Research and Program Management. As you know on August 15, 1986, the Administration announced that NASA was being directed to construct a replacement orbiter for Challenger and that they intend to request an amendment to the FY 1987 NASA budget request of $272 million. With this amended budget, the total revised NASA budget request is $7.966 billion, of which $3.032 billion is for Research and Development, $3.343 billion for Space Flight, Control and Data Communications, $166.3 million for Construction of Facilities and $1.425 billion for Research and Program Management.

This budget amendment provides $250 million for initiation of procurement of an orbiter to replace the Challenger and $36 million for procurement of inertial upper stage airborne support equipment to replace that lost in the Challenger accident. The budget amendment also includes reallocation of $94 million to augment activities directed toward resolution of Space Shuttle system anomalies and to respond to recommendations of the Rogers Commission. To accommodate some of this increase, $108 million of offsetting reductions have been applied. These reductions have come from further savings from termination of the Centaur Upper Stage, savings in Space Science and Applications and Space Transportation Capability Development due to further delays in planned missions, and reductions in funding for technology activities planned on the Transatmospheric Vehicle, Commercial Use of Space, Tracking and Data Relay Satellite (TDRS) and in Construction of Facilities. These adjustments, when combined with the previously identified funding adjustments of approximately $800 million related to the twenty-four month hiatus in Space Shuttle missions, result in the revised appropriation totals listed above. I want to emphasize that all of our planning assumes we will receive $531 million in shuttle reimbursements from the DOD.

As we have testified in the months since the Challenger accident, even with the program changes which have resulted, a large part of the program presented in the President's budget remains valid. The United States remains committed to the development of a permanently manned Space Station, and the budget request before you reflects this commitment. Recognizing that the Space Station is essential to ensuring American leadership in space during the 1990's and beyond, President Reagan has continued to reaffirm his support, most recently in the August 15 announcement on the replacement orbiter. In the decades ahead, the Space Station--still our next logical step--will enable us to continue the exploration and utilization of space, an enterprise in which the United States traditionally has excelled. The Space Station will represent a new level of capability in space. It will be a permanently manned facility for science, commerce and technology.

The FY 1987 budget request initiates development of the Space Station, an event that is extremely important. It will signal to our international partners that the U.S. commitment to the Space Station is firm and that their own budgetary and intellectual resources can safely and productively be devoted to a cooperative Space Station Program. It will signal the private sector here in the United States that future investments in commercial space activities can be planned with confidence. It will signal to U.S. industry that the Space Station Program is on track and that its own investment of money and talent is justified. In addition, moving forward as planned will signal the Soviets, who now have an operational Space Station, that their current advantage will not remain unchallenged. Perhaps most importantly, proceeding with Space Station development and replacing Challenger in FY 1987 strengthens the commitment to U.S. leadership in space in the 1990's and beyond and signals America's intention to look confidently to the future.

A major feature in the science and applications portion of the FY 1987 budget request is the initiation of the TOPEX flight program. This ocean topography experiment, which is being conducted in conjunction with France, will provide information leading to an understanding of the world's oceans far exceeding anything known in the past. The fact that 85 percent of the Earth is covered by oceans and that much of this area is far from normal shipping lanes or aircraft overflights has prevented the ocean science community from effectively addressing the question of ocean circulation on a global basis. We anticipate that TOPEX will result in a greatly expanded understanding of how our ocean systems work. This will be of great benefit to both the ocean science community and to users of ocean data such as shippers, fisherman, and others dependent on the ocean as a source of resources or income.

A series of already-approved space science and applications flight projects are progressing toward flight readiness. While the launch dates of these projects are obviously delayed by the Challenger accident, their objectives and their importance to the expansion of human knowledge remain unaffected. When we resume space launches, the Hubble Space Telescope, which will provide a quantum jump in our ability to observe the universe; Galileo, which will probe the giant planet Jupiter; and Ulysses, the ESA-developed mission to probe the polar areas of our Sun, will be ready for launch. The cancellation of the Centaur program has caused us to reexamine launch options for the planetary programs. We are in the process of examining the issue now and will be sure to keep you informed of any decisions that are made. Other space science and applications missions included in this budget are the Gamma-Ray Observatory; Magellan, a mission to map the planet Venus; the Mars Observer; the Upper Atmospheric Research Satellite; and the scatterometer sensor for the Navy's Remote Ocean Sensing System (N-ROSS). In the field of solar terrestrial physics, we are proposing a program which will allow us to participate as experimenters in a comprehensive international research program.

The budget includes a continuing substantial and very productive program of research and analysis in areas ranging from physics and astronomy, to life sciences, to geodynamics, to upper atmospheric research and many other areas. The most striking product of this program in recent months has been the highly successful and exciting Voyager spacecraft encounter with the planet Uranus. Some of the important new findings include fundamental scientific discoveries about the planet Uranus and its rotation, magnetic field, atmospheric structure, rings and satellites. Observations of the innermost moon, Miranda, show perhaps the geologically most unique moon yet encountered in the solar system.

The budget request also provides for the important continued investment in advanced space technology. In the space research and technology program, increased emphasis is planned for automation and robotics research to enhance the productive and effective use of space and on transportation technology for low cost access to and from space and between orbits.

In his State of the Union address to Congress this year the President referred to research underway on a joint NASA/DOD National Aerospace Plane Program. The aerospace plane is a vehicle, part aircraft, part spacecraft, which could fly from the Earth through the atmosphere into space and back. A significant initiative in the NASA budget involves focused research on aerospace plane technology and is a direct outgrowth of advances and breakthroughs made during the past decade in NASA's ongoing aeronautics and space research and technology base programs. The critical elements of the program will include airbreathing propulsion systems that can operate from take off to near orbital speeds, reusable efficient thermal structures, and integration of the propulsion system and airframe for a minimum weight system with good performance throughout a broad range of acceleration, cruise, and maneuvering flight conditions. Advances in many of these technologies will be applicable to both airbreathing and rocket powered vehicles, thereby further increasing the potential payoff to all future space transportation systems. The technology development in this next phase of the program will provide the basis for a future decision to proceed with the experimental vehicle phase of the program.

During this past year, the White House Office of Science and Technology Policy announced the establishment of National Aeronautical R&D Goals designed to focus U.S. research and development in high pay-off technology areas that will sustain the Nation's aeronautical preeminence into the 21st Century. Our program of aeronautics research and technology is proceeding to meet these goals by providing the cutting-edge technology for future aircraft. As an example, the advanced turboprop propulsion system, which is receiving increasing industry attention and support, has begun a series of industry and government flight tests and may soon lead to a whole new generation of fuel efficient transports. The rapid rate at which turboprop technology is now maturing is due in large measure to the broad technology base we have developed over the past decade. In July the Numerical Aerodynamic Simulation (NAS) capability reached operational status. NAS is the most powerful computing system in the world and a national resource for computational solutions to complex fluid flow and structural problems encountered in advanced vehicle concepts.

Mr. Chairman, I am confident that we will correct the causes of the Challenger accident and the shuttle will emerge as a stronger, safer system capable of meeting space launch needs for years to come. The introspection that NASA is undergoing as a result of this accident investigation will make NASA a stronger agency committed to innovation and technical excellence that will retain American preeminence in space into the next century. Space has been, and with the shuttle, our science activities and the Space Station, it will continue to be, an American frontier.

Mr. Chairman, this completes my prepared statement. I would be pleased to respond to questions you and other Members of the Subcommittee may have.

DEFENSE APPROPRIATIONS

Senator LAXALT. Dr. Fletcher, thank you for an excellent statement. On behalf of Senator Garn and the members of the subcommittee, we also commend you for getting back into the situation under rather trying circumstances to say the least.

Our reading is that NASA has come a long way since its troublesome months, prior to the Rogers Commission. I think I speak for the members of the subcommittee generally in support of the President's position. As you indicated, the function of NASA is critical to this country in many ways.

May I ask you a question or two?

Dr. FLETCHER. By all means, Mr. Chairman.

DOD APPROPRIATION IMPACT ON NASA

Senator LAXALT. You alluded to the Defense Subcommittee's action. They recommended that the Department of Defense provide the $3 billion needed to replace the *Challenger*, but that the $531 million expected as reimbursement to NASA in fiscal year 1987 not be funded.

While this proposal will undoubtedly relieve your agency of a significant burden in future years in terms of additional orbiter funding, it does entail an especially difficult burden in fiscal year 1987. Essentially what they have done is assume the capital burden for $3 billion off your back, which isn't all that bad, but in the process, you have assumed a greater operating burden. This is what it amounts to, I assume.

Will you please, for the members of the subcommittee, and for the record, outline the nature of this mixed blessing as you see it? Do you think that, on balance, NASA can benefit from this change in congressional funding, and what will be the impact on your fiscal year 1987 program if funds to cover the DOD reimbursement are not forthcoming?

Let the record indicate the presence of the ranking member of the subcommittee, Senator Leahy.

Dr. FLETCHER. Mr. Chairman, as you appropriately indicated, the action by the Defense Appropriations Subcommittee is a mixed blessing. It is certainly welcome that funding could be provided up front for the entire cost of the orbiter because this saves a lot of negotiation in the out years as various people try to take the money for the shuttle out of NASA's normal budget.

On the other hand, I have to emphasize again that our first priority at NASA, at the moment, is to get the shuttle flying again, and we hope to do that in the first quarter of 1988. That $531 million that was owed to us by the Defense Department is a necessary part of getting the shuttle flying again in the first quarter of 1988.

NASA'S BUDGET REQUIREMENTS

What it means is that we need the $7.7 billion that was our original budget before it was amended by the addition of the fourth orbiter, plus an additional $531, which takes it up to a total of $8.2 billion. So unless we get that $8.2 billion somehow, we won't be able to fly in the first quarter of 1988.

Having said that, I don't have a brilliant idea on how we get that money restored to us by the Defense Appropriations Subcommittee. As you know, the Senate authorization bill for the Defense Department did restore the $531 million, and the same happened in the House authorizing committee. In the House Appropriations Committee, they replaced $383 million of it, but not the full amount.

So somehow, we really need to get the full $8.2 billion to be able to fly again on schedule. On top of that, we would like to get the replacement orbiter started. Somehow it all has to be worked through so that we get $8.2 billion of budget authority, plus somehow a start on the fourth orbiter.

It is not important that we get the full money, although it would save us a lot of trouble in the out years. It is important that we do get a start on the replacement orbiter somehow. The attempt of the President was to put $272 million in as an amended budget so that we could get started. It was assumed in this budget that the $531 million would be available from the Defense Department.

ORBITER FUNDING AND OWNERSHIP

Senator LAXALT. Tell me, the incorporation within the Defense budget of the orbiter cost, does that cause any internal heartburn on the part of the NASA people at all?

Dr. FLETCHER. I am sure that some of the NASA people are a little bit concerned as to how that is all going to play out, Mr. Chairman.

Senator LAXALT. In terms of jurisdiction?

Dr. FLETCHER. In terms of jurisdiction and who pays who for what. We have been able to negotiate these kinds of things before with the Defense Department. They are, after all, implementing the Western Test Range for accommodation of the shuttle. They have also supplied the upper stage, the inertial upper stage, for the shuttle. But we do need the shuttle for an entire fleet. The Defense Department will be using a significant fraction of the capacity of that four-orbiter fleet. It doesn't seem inappropriate that they should be funding one of the orbiters.

I think that our main concern is that we do get the $531 million so that we can fly again, and we don't lose that in the process. We are grateful, from my point of view at least, although there is always a concern as to what color we should paint it, whether it is an Air Force blue, or whether it is a NASA, I think we will both use that shuttle, and I am not too concerned about negotiations with the Defense Department.

QUESTION OF SHUTTLE OWNERSHIP

Senator LAXALT. Senator Leahy.

Senator LEAHY. Thank you, Mr. Chairman.

Are you saying, then, that the question, Dr. Fletcher, of who controls the shuttle is something that you are going to work out administratively, or would you like the gentle hand of Congress to point you in the appropriate direction?

Dr. FLETCHER. A gentle hand from Congress, Senator Leahy, would not be unwelcomed. The question of ownership is the only question at hand.

As far as operating the shuttle, I think the language of the bill indicates that NASA will continue to operate the shuttle no matter who owned it. I think that there would have to be negotiations as to what the manifest would be of all of the shuttles, whether it is owned by the Defense Department or ourselves. We have to do that anyway. The current manifest, which, hopefully, Dick Truly will have available next week sometime, has to be negotiated carefully with the Defense Department anyway because perhaps one-third, or maybe more than one-third of the payloads, will be defense. So it is not unnatural that they contribute to the fleet in terms of this money.

Senator LEAHY. Could you conceivably be getting the best of all possible worlds? You are the only game in town in terms of launching the space shuttles and now you have the Department of Defense paying for one of it. This will take a lot of pressure off your budget. If it does not do so this year, it will certainly do so next year, will it not?

Dr. FLETCHER. Senator Leahy, that is the whole idea. It does take off pressure next year, but we don't want to do that at the expense of not being able to fly in the first quarter of 1988.

Senator LEAHY. I understand that.

Dr. FLETCHER. So that $531 million is important, too.

REMOTE MEASUREMENT OF FOREST DAMAGE

Senator LEAHY. That was going to be my next point.

Dr. Fletcher, I appreciate your call to me up in Vermont on Friday. Incidentally, the next day, which was a gorgeous day in Vermont, I spent Saturday flying in one of your helicopters up there. The helicopter flight, for me anyway, is always exciting. I consider helicopters sort of like bumblebees. I do not completely understand how they fly, and I prefer that if they do, they fly with somebody else on board. But it was also exciting from a scientific point of view.

The flight showed me that you can cover hundreds of square miles of territory, assessing forest damage in a single day. This was done in conjunction with a study being done at the University of Vermont, where they had used volunteers to cover many acres by foot over the years. We, in about an hour, covered miles doing much the same thing. They pointed out that if the shuttle was used, all the forest damage in the United States could be assessed in a few months.

There has been concern that space science will lose out as the result of the grounding of our launch capacity.

I was glad to hear that you are putting together the space science vitality package, and I think that is going to put space scientists to work examining and correlating the significance of some of our existing data.

EARTH SYSTEMS SCIENCE

Continuing things we touched on in our conversation on Friday, will you commit a significant portion of these funds to analyze and correlate existing data on global atmospheric issues, such as the greenhouse effect, acid rain, and ozone depletion?

Dr. FLETCHER. Senator Leahy, that is an important thrust, not only of NASA, but we have a combined program between NASA and NOAA and the NSF, which we call Earth systems science. This is, hopefully, going to be an international program to do just what you say; namely, to look at the atmospheric changes globally, to respond to such things as contamination of the atmosphere, contamination of the Earth because of atmospheric constituents, and climate changes due to either man's changing of the environment, or nature's changing of the environment through things that man may or may not have done.

All of that, I think is an important thrust internationally. Many of our programs are slanted in that way, including, as you remember, one part of the Space Station. One part of the Space Station is directly involved in a polar orbiter, which will be up there, let's say, forever, or for a long time, being serviced by the Space Station. That mission is scheduled to fly, I think, in 1993, or thereabouts. I am not sure of the exact time, but somewhere around 1993.

So, yes, Earth systems science or, if you like, the global atmospheric science, is an important thrust of NASA these days.

GREENHOUSE EFFECT

Senator LEAHY. Dr. Fletcher, I understand that Dr. Hansen, of Goddard Institute of Space Studies, in his study of the greenhouse effect, prepared estimates of how much the average temperature in U.S. cities could rise as a result of the greenhouse problem.

When I thought of temperature increases I naturally thought of Washington. There are a lot of things that could cause the temperature to rise in Washington, but I think this study was predicting temperature increases only from the greenhouse effect, and hot air coming from above, not from indigenous hot air. It showed the temperature could rise by an average of 5 degrees in U.S. cities.

I am not a scientist, but in talking to scientists, they tell me that if this occurred throughout the United States and the world, all of our coastal cities could be flooded, and the grain belt could be shifted hundreds of miles north.

Is it possible for the agency to prepare a similar set of temperature predictions for all the regions of the United States and for other world capitals?

Dr. FLETCHER. Senator Leahy, it is possible. We could do similar calculations for any part of the world. However, right now, these are guesses. They are educated guesses, to be sure. But that is the purpose of this Earth Systems Science Program, it is to try to pin down some of the variables.

Senator LEAHY. Obviously, we have to have educated guesses, nobody wants to see the time come when we are going to have empirical data on something like this.

ATMOSPHERIC CARBON DIOXIDE

Dr. FLETCHER. You are quite right. But there are a lot of unknowns. For example, one of the major contributors to the greenhouse effect is carbon dioxide in the atmosphere. Carbon dioxide suppresses the reradiation from the Earth caused by the warming, because it absorbs some of the infrared. It is known that carbon dioxide is increasing in the atmosphere, but all the places where it comes from are not known. Some of it comes from deforestation, for example. It is also not known where it goes. A fair amount should be absorbed by the oceans.

One of the purposes of this program that we are putting together is to look at carbon dioxide and all the other constituents that cause warming, like methane, and see what the ebb and flow of these constituents are, how they are generated, and how they are absorbed. The ocean is a very big part of that, and our national forests are a very big part of that.

We don't really have the variables pinned down to make accurate forecasts. We can say with some confidence, I think, that indeed the atmosphere is warming, but we don't know what the time scale is right now. Hopefully, we will be able to pin that down a lot better. What we do about it is something else again.

Senator LEAHY. I understand. I am not suggesting that you are going to be able to tell us exactly what to do about this complex problem, but could you have your staff meet with me and see if we could work out some areas where you have at least some educated guesses.

Dr. FLETCHER. I am sure we could do that, Senator Leahy. We will provide that, but I can't say how soon. We will certainly do it, though.

Senator LEAHY. Have them meet with me soon, and then we can figure out what is available and what is not.

Dr. FLETCHER. Sure.

NASA ADVISORY COUNCIL/LONG-RANGE GOALS

Senator LEAHY. I have other questions, which I can submit for the record. One I will ask now relates to the concerns of the NASA's Advisory Council's statement at the August meeting. Let me just read a couple of sentences from that statement.

The Advisory Council stated that it had "great concerns to whether NASA can any longer meet the mandate for national space preeminence established by the National Aeronautics and Space Act." Then they concluded, "The Nation has no long-range goals established to serve in a policy context as the framework for specific programs and missions."

I know we have well-articulated goals for the military space program—it is star wars. This goal has been stated over and over again in the budget and the policy statements. But in the civilian space program the goals are unclear, I still need to be convinced of the need for a Space Station. I have been a strong supporter of the space shuttle, but I have some questions that we need a fourth one. This is one of the reasons why I looked for this Advisory Council's statement.

Why isn't there a clear, long-range goal for the civilian space program? Some of us who are asked to vote billions of dollars for the future are going to really need that support.

Dr. FLETCHER. Senator Leahy, I think the criticism of the NASA Advisory Council was valid, but it has to be interpreted in context. When they say there is no valid long-range program, they are saying, looking beyond the year 1992 to 1994, it is not clear where NASA is going.

We have a pretty good outline of where we are going in the next 6 to 8 years, and our budget that we are presenting today pretty much outlines that through to the days of the Space Station. Beyond that, however, I think there are some gaps, and we are taking the comments of the NASA Advisory Council and others who have made similar studies seriously. We have set up a number of programs to deal with that. Unfortunately, we don't have the answers today.

I didn't mention that in my opening statement, but Dr. Sally Ride has volunteered to come back and pull together the various activities that are going on that we have initiated at NASA dealing with what direction are we going, and what direction we should be going. These are policy issues, pulling together some of the options that we might pursue beyond the 1992 to 1994 period. She calls it the Space 1995 Study.

I don't know when that information will be available, but, hopefully, next spring we will have a little better idea of the directions NASA ought to be going.

SPACE STATION

Senator LEAHY. But even when we talk about 1992 or 1993 in terms of building the Space Station and another orbiter, and all, we are asked to commit billions and billions of dollars. Part of the underlying rationale being that this will pay off as we go beyond those times, that there is a reason for more than just the building, whether it is the Space Station, or anything else. A sense of purpose that will continue beyond 1992 and 1993.

I can get the plans, discussions, and the rationale, whether I agree or disagree with them laid out for SDI, the defense program in space. The civilian program is also an extraordinarily expensive one, and it may well be justified. Certainly I want to see the United States preeminent in space, but I want to see more than just a demonstration of technical virtuosity in space, as I am sure you do.

I only mention this because it is going to be more and more difficult, certainly for me speaking as an individual Senator, to give the kind of support I have given pretty clearly in the past on NASA programs, without NASA having clear goals. I realize that goals can change. I realize scientific knowledge can improve. I also realize that we are exploring into areas where there are no immediate answers because we are pushing the frontiers of science, as we should be. In fact, one of the things that appeals to me the most about NASA is the fact that it does push the realm of science.

I would only suggest, and I suspect there are other Senators who feel as I do, we need a clearer vision of just where we are going, and what our goals are, and what the civilian uses of space will be.

SPACE STATION OBJECTIVES

Dr. FLETCHER. Senator Leahy, I would like to comment on some of the things you just said.

We have a pretty clear idea of what the Space Station will be used for. It is not simply a permanent man presence in space. The objectives of the program are rather clearly delineated in our various publications, but let me see if I can go through some of them.

It is going to be heavily oriented, for example, to physics and astronomy. There will be attached payloads to the Space Station which look out into the universe, and that is the reason why we have these extended arms on the Space Station so that the astronomical part will be separated from the place where the astronauts live.

In addition to that, we have a new science which we term "microgravity science," which allows you to make experiments, primarily with biological materials, separation of biological materials, but also the production of new pure metallic, or semimetallic materials. Then last, but not least, new alloys. You can make alloys in microgravity that you can't make on Earth because it is like water and oil, they don't mix on Earth, but they mix just fine when there is no gravity. You can do all of these microgravity experiments on a Space Station, and it is designed to do that.

In addition to that, we expect the first small step toward manufacturing in space to be done on the Space Station. There are a number of companies that have signed up to do what we call commercialization of space in connection with the Space Station.

So the Space Station will be heavily utilized by scientists, both the physicists and astronomers, as well as the solim state physicists, the physical chemists, and the life scientists. All of these will be involved heavily in the Space Station, and that is what it is designed for.

In addition to that, it does move the frontiers so that man is moving out on a permanent basis into space, but that goes with all of the scientific experiments that I tried to enumerate. That has always been a part of the program, but it is just beginning to be defined a little better in most recent weeks. I apologize for not being able to get to you before and go through some of that with you.

Senator LEAHY. It was not for the lack of trying, I know you tried, and I was spending a lot of time in Vermont. Thank you.

Thank you, Mr. Chairman.

IMPLEMENTATION OF ROGERS COMMISSION RECOMMENDATIONS

Senator LAXALT. I thank the Senator.

Dr. Fletcher, as you know, the Defense bill calls for NASA and DOD to jointly certify that the Rogers Commission recommendations are being implemented. Does NASA have any problems with this joint certification requirement?

Dr. FLETCHER. I would like to pass to Admiral Truly to respond to that, but I can say that the NASA Administrator has no problem, but that is because I have delegated most of that activity to Admiral Truly, and he has the ball on that one.

Admiral TRULY. I am not sure precisely what was intended by that wording. I can assure you that we have a program and actions in place that have been in place for some time to each of the recommendations of the Presidential Commission. There were nine recommendations in total, and 30 days after Chairman Rogers submitted his report and recommendations to the President, we submitted that response that you have there, which is my plan to answer each and everyone of them. I would be pleased to go into whatever detail, either here or some other time, with our status on them, but we are doing extremely well. I view that as NASA's sole responsibility.

I am assuming that the language that was put in the proposed legislation was intended to assure that if the DOD did fund the replacement orbiter that they would be likewise assured that the recommendations were properly met. I think that we have a program in place that we have presented to the President. We are on track with it. There is an amount of work to be done, and has already been accomplished, and it is pointed at doing what I think is the most important thing today in the Nation's space program, and that is reachieving our access to space, which will culminate in the next shuttle flight in the first quarter of 1988.

Senator LAXALT. I think that it would be worthwhile just to include in the record the report to the President that you referred to, Admiral. It is entitled, "Actions To Implement the Recommendations of the Presidential Commission on the Space Shuttle Challenger Accident." I would think that my colleagues, if they haven't seen them before, would find them beneficial. If there is no objection, we will cause them to be filed.

[CLERK'S NOTE: The entire report is available in the subcommittee file.]

ORBITER PROGRAM FIXES

Senator LAXALT. Dr. Fletcher, can you please outline how the $526 million provided in the supplemental and the $139 million in your amended request will be utilized?

Dr. FLETCHER. Mr. Chairman, there is a long list of things that are included in that $526 million, plus the $139 million. I can begin by saying that the most important expenditure in the program is to fix the problem that caused the accident, which involves the seals.

There are four major segments plus a nozzle that have to be assembled in a vertical way to produce the solid rocket motor, and connecting these segments are seals so that no flame is allowed to leave the cracks, shall we say, in between the segments. We provide rather sophisticated seals to make sure that that doesn't happen. As you know, the O ring, a combination of the O ring, which helped with that seal, plus the putty that kept the O ring from being exposed to pressure early on, failed.

To fix that, we have a number of designs, all of which are likely to solve that problem. But it does take a fairly major test program, a qualification test program, and this means that you have to design the seal for each one of these segments, that works under the various environmental conditions.

You have to then test them on a small scale to make sure that you haven't made a mistake. Then finally you have to provide at least two other tests on a full scale, what we call an engineering test and a qualification test. The qualification test must be run with the actual seal in place with the environmental conditions something like what you might expect at the Cape.

When you put all of that together, it absorbs a fair piece, probably half of the total of $536 and $139 million. While we are down, we decided that we might as well fix a lot of other things that we thought were not marginal, but questionable, and some of these things have to do with the connection between the external tank and the orbiter itself. There is a large hydrogen connection, which I think is 17 inches across, that has to be broken at the time that the shuttle leaves the external tank and goes into orbit. The external tank is discarded in the Indian Ocean. That has to be looked at.

Then there is a number of recommendations or things that we want to do having to do with the engine itself. The space shuttle main engine has shown some signs of wear that have given us some concern, and we want to make sure that we understand the reasons for that. Cracks, for example, appear in some of the turbine blades.

This is just a beginning list, but Admiral Truly could go on with a large number of other items. Some of them were recommended by the Rogers Commission as things that ought to be replaced because of the very rapid turnaround time required to be fully operational with the shuttle, things like simulators, and other items, all are in that amount of money. Do you want to go on with some other items?

RECERTIFICATION OF SHUTTLE PARTS

Admiral Truly. I think what I would say is that following the Commission's report and, as a matter of fact, preceding the delivery of it, we have taken a systematic look at the total shuttle system, not only the solid rocket motor that failed, but also the hardware and the support that it requires.

Since we had just had the accident, in order to reassure ourselves that when we fly again the shuttle will be ready to fly, we took what we call the criticality 1 and the criticality 1R items, and those are items that by their definition, should they fail, would cause the loss of vehicle or the crew. We essentially cancelled the certification on each of those items, and we are requiring them to be recertified. Dr. Fletcher mentioned several of them: the main engine components, the solid rocket motor, and there is a long list.

The funds that are being requested and are needed are in many cases to fix those mandatory items, but it is a very systematic process and one that will take us into the first part of next year before we have made all of the decisions that are required.

Dr. FLETCHER. Mr. Chairman, if it would be useful to you, we could provide a list of some of the items that we are considering as being fixed for the record. It is a fairly comprehensive list.

Senator LAXALT. Is it different from the one that has been provided to me by staff, a detailed printout?

Dr. FLETCHER. I would guess that it is the same, Mr. Chairman.

Senator LAXALT. So what you are saying, essentially, is that if you have the appropriate funding to make these modifications and improvements that have been indicated by the Rogers Commission and by the agency itself, you will be able to go ahead in the first quarter of 1988 under what we hope will be completely safe conditions, if that is possible?

FISCAL YEAR 1988 DOD REIMBURSEMENTS

Dr. FLETCHER. Mr. Chairman, I want to say what you just said, but make sure that added to that is the $531 million that is owed us by the Defense Department. We do need that money.

Senator LAXALT. I understand that this is a minor caveat.

Dr. FLETCHER. Yes.

Senator LAXALT. I will ask you one last question. We have several others, but we will submit those to you in writing in the interest of time.

Report language proposed by the Defense Subcommittee directs DOD to reappraise its reimbursement policies to reflect previous payments for flights which have not occurred. You made brief reference to that previously.

What is your current estimate of fiscal year 1988 DOD reimbursements and do you see a change as a result of this reappraisal?

Dr. FLETCHER. Mr. Chairman, we understand the language of the Defense Appropriations Subcommittee to mean that we ought to look through our entire reimbursement policy and decide which are required and which are not required, and what the amount should be because the prices have changed. On the other hand, we can give you specific answers to what we had expected to receive in fiscal year 1987, $531 million.

Mr. Newman, you have the data for fiscal year 1988.

Mr. NEWMAN. Yes, sir.

In the original budget, the DOD reimbursement for shuttle operations would have been about $800 million. In the revised planning, if they paid for the 1988 and 1989 missions in fiscal year 1988, as they would under the ground rules, the reimbursement would be about $572 million. But with the payment that they would make in fiscal year 1987, the $531 million, they would be entitled to a credit in fiscal year 1988. Under those circumstances, the reimbursement in fiscal year 1988 would be essentially zero, taking the credit for the payment in 1987.

Senator LAXALT. The reappraisal, so that I understand fully, doesn't amount to a readjustment of the formula for reimbursement, does it, between the agencies?

Dr. FLETCHER. The price of a launch may change as a result of all these modifications that Admiral Truly talked about.

Senator LAXALT. But those are additional costs.

Dr. FLETCHER. There may be additional costs. I don't think they are going to be large increases in cost, but nevertheless, I think that this is one of the things they referred to. As far as the reimbursements that they have now, we have to give them a credit for the money that they are going to pay us in fiscal year 1987, which amounts to 10 flights, or something like that, starting in fiscal year 1988.

I guess what I am saying is that there are two separate issues. One is the price and the other one is what we owe them. I think that right now we owe them 10 flights.

Senator LAXALT. Is there anything that the members of the panel would like to offer to complete the record?

Senator Leahy, do you have anything additionally?

Senator LEAHY. No, thank you, Mr. Chairman. I have some questions for the record on the scheduling of launches.

Senator LAXALT. We have as well, which Senator Garn asked to be submitted, and we will do that.

We certainly thank you. It has been a most interesting hearing.

Dr. FLETCHER. Thank you, Mr. Chairman.

SUBMITTED QUESTIONS

[The following questions were not asked at the hearing but were submitted for response for the record:]

Questions Submitted by Senator Garn

House Caps

Question: What are schedule and operational inpications of the caps that the House Appropriations Committee has placed on NASA programs?

Answer: Funding limitations were included in the House Appropriation report for several NASA projects. These "caps" include:

Space Station - $260.0 million
Upper Stages - $176.0 million
Space Telescope - $96.0 million
Magellan - $70.0 million
Topex - $10.0 million
Galileo - $48.0 million

This year we feel these funding limitations could reduce our flexibility to meet unforeseen problems. In the past, we have generally had a good response from the Committees when it was necessary to make an adjustment in order to exceed the amount of a cap. Nearly all the caps will require some adjustment during the fiscal year. With prompt approval from the Committees, we do not foresee any schedule delays or technical problems. It is our intention to work closely with the Congress in planning the wisest use of NASA's funds and avoiding any adverse impacts.

Science, Applications and Planetary Launches

Question: As best you can, please prepare - for the record - a list of your candidate Science, Applications and Planetary flight projects by fiscal year from FY 1988 through FY 1995.

Answer: Planned and potential new start candidate missions for the Office of Space Science and Applications (OSSA) are provided below:

- Near Term (FY 1988 - FY 1990)

- High Resolution Solar Observatory (HRSO)	FY 1988
- Global Geospace Science (GGS)	FY 1988
- Mariner Mark II (Comet Rendezvous Mission)	FY 1989
- Advanced X-Ray Astrophysics Facility (AXAF)	FY 1990

- Longer Term (FY 1991 or Later)
    - Geopotential Research Mission (GRM)
    - Lunar Geochemical Orbiter (LGO)
    - Space Infrared Telescope Facility (SIRTF)
    - Gravity Probe-B Science Mission
    - Earth Observing System (EOS)
    - Geostationary Platform
    - Cassini (Saturn Orbiter/Titan Probe)

ACTS

Question: There is no funding reflected in your FY 1987 revised request for the Advanced Communications Technology Satellite (ACTS) Program. The House Appropriations Committee has provided $77 million for ACTS in their markup of the FY 1987 bill. How much money has been spent on ACTS to date?

Answer: Through the end of Fiscal Year 1986, approximately $200 million will have been invested in ACTS. Of that amount, approximately $45 million was invested in proof-of-concept activities and $155 million has been obligated as part of the current ACTS system development contract.

Question: If Congress were to provide the level of the House Allocation, what would be the earliest year for launch recognizing the backup of flights that currently exists?

Answer: Given the House Appropriation mark of $77 million, a launch in late 1991 or early 1992 would be planned. As you recognize, the availability of a Shuttle launch along with a compatible funding profile are key elements in establishing the launch data for ACTS.

Question: Does this mean that the satellite would have to be stored for some period of time prior to launch and what level of storage costs might we expect for ACTS?

Answer: Currently we do not plan to store ACTS. However, by the very nature of their design, communications satellites, including ACTS, store relatively inexpensively. They contain no complex optical systems, no cryogenic systems, and no sensitive detectors or sensors commonly found on scientific satellites that require manpower intensive cleaning, monitoring, etc. Storage costs for a completed ACTS spacecraft would run about $300-400 thousand per month.

Space Science

Question: The loss of the Challenger and the expected two-year downtime of the remaining orbiter fleet have caused delays in the launch of many space science and applications missions.

Please outline the magnitude of this problem as well as what plans you are formulating to address it.

Answer: The loss of the Challenger and the resulting downtime in Shuttle operations has had a major impact on space science and applications missions. Pre-Challenger plans called for about 50 equivalent (dedicated plus partial payloads) Shuttle flights for science and applications missions through FY 1992. The current projection is for about 17 equivalent Shuttle flights. The resulting backlog of 33 flight opportunities translates into major delays for all programs and cancellation for some programs.

In response to this situation, we are looking at the use of a mixed fleet of launch vehicles to help alleviate the backlog.

In addition, we will rephase and replan certain missions in an effort to accommodate as many of our pre-Challenger plans as possible. We expect to be in a position in the near future to identify a disposition status for all of our science and applications missions.

Question: In order to get the Space Science and Applications program back on track, should a "mixed fleet" launch vehicle policy be adopted?

If so, how and when will you implement the policy?

Answer: Yes, a "mixed fleet" is needed to help get the Space Science and Applications program back on track. The Office of Space Science and Applications (OSSA) is nearing completion of a study on this question and final recommendations are expected in mid-October. The Office of Space Flight was recently assigned an action to identify mixed fleet requirements for the entire Agency by December 15, 1986. The OSSA findings will serve as a major input into the overall Agency assessment.

Question: While issue can be taken with the calim that the Shuttle is a more economical launch system then ELV's, certainly on an additive or marginal operational cost basis it is highly competitive.

What estimates do you have on the cost, and availability of Expendable Launch Vehicles, including the "new" Titan IV?

Answer: As you know, NASA Expendable Launch Vehicles were scheduled to be phased out as the Space Shuttle became operational and as a consequence, only a small inventory of Expendable Launch Vehicles is currently available to launch those payloads for which vehicles exist. Below is a summary of cost and vehicle availability of NASA Expendable Launch Vehicles:

Vehicle	Estimate Cost per Veh.	Vehicles Available	Remarks
Delta	$50 to $55M	3	1) The vehicles available will support firmly scheduled payload requirements. 2) Two partly completed vehicles can be completed if required. 3) Spare parts exist to initiate additional 8 vehicles if necessary. 4) 30 months required to reestablish production.
Atlas Centaur	$80M	3	1) Vehicles firmly scheduled for DOD payloads. 2) Production is essentially completed.

			3) 30 to 36 months required to produce follow-on vehicles if needed.
Atlas-E/F	$15M	4	1) Vehicles firmly scheduled for NASA/NOAA weather satellites. 2) Vehicles are modified surplus DOD vehicles. 3) Not in production.

Titan IV - Since the DOD is the manager and operator of the Titan IV, it would be more appropriate that the DOD furnish cost and availability information.

Space Sciences

Question: The Science Community feels that a number of Space Science projects were lost in the past decade because of the cost of the Space Shuttle.

In what timeframe do you expect to launch such high visibility projects as the Hubble Space Telescope and the Galileo Mission to Jupiter?

What launch vehicles do you expect to use for these missions?

Answer: We expect to launch the Hubble Space Telescope in late 1988 on the shuttle. We are in the process of assessing the most appropriate means of launch for Galileo and are considering either the Shuttle with an IUS or a Titan-IV/Centaur. A decision on Galileo is expected in the next few months.

Question: Are you considering using Expendable Launch Vehicles (ELV's) for any of the Space Science missions?

a. Which missions and when?

b. In what budget will you be asking for funds for these ELV's?

Answer: The following science missions are candidates for launch on Expendable Launch Vehicles (ELV's):

Payload	Vehicle	Launch Date
COBE	Delta	1st Quarter, CY 1989
ROSAT	Atlas Centaur	1st Quarter, CY 1989
EUVE	*Delta	1990
GEOTAIL	*Delta	1992
WIND	*Delta	1992
POLAR	*Delta	1992
CLUSTER	*Atlas Centaur	1993
CRAF	Titan-IV	1993

*Final vehicle selection to consider results of the MLV acquisition.

In addition, an ELV option (i.e., Titan-IV/Centaur) for Galileo and Ulysses is being considered.

It is expected that an overall Agency position on a mixed fleet will be established early next year. Funding requirements and mode of budgeting will be identified at that time.

Question: You plan a new start for TOPEX (the Ocean Topography Experiment) in FY 1987. The science community wants the maximum overlap between TOPEX and Navy-NROSS satellite using the NASA Scatterometer.

a. How much are you requesting for TOPEX and the Scatterometer in FY 1987?

b. When would each be launched based on your assumed funding and how much overlapping flight time would there be for these two satellites?

Answer: a. NASA is requesting $29 million for TOPEX and $35.9 million for the Scatterometer.

b. This level of funding would permit the launch of N-ROSS in September 1990 followed by TOPEX in October 1991. Since both missions are being designed to operate for three years, these launch dates would permit almost two years of overlapping flight time. This is one year less than the maximum possible, but two years overlap would allow a good level of science return in terms of intercomparing the ocean's forcing function (winds/Scatterometer) with its response (topography/TOPEX). Also of significant interest to the science community is achieving the maximum overlap between the European Space Agency (ESA) ERS-1 and TOPEX. Such overlap would lead to improved coverage of the polar regions not mapped by TOPEX. But with an ERS-1 launch in December 1989, the overlap would only be slightly in excess of a year, which is right at the minimum threshold for doing anything scientifically useful. Thus, the importance of fully funding both Scatterometer and TOPEX should be apparent.

Office of Commercial Programs

Question: Please outline NASA's current planning for the commercialization of Expendable Launch Vehicles (ELV's)?

Answer: NASA is encouraging the commercialization of United States expendable launch vehicles (ELV's) pursuant to the National Security Decision Directive of May 1983. Under these arrangements, private sector firms could initiate production and launch on a commercial basis. Initiation of such production must be accomplished without any government funding or liability. The private sector firms may sell the launch vehicles and services to nongovernment customers. It is our intent that nothing in these agreements shall prohibit the United States Government from procuring ELV's and related launch services directly from the manufacturer. NASA wishes to accomplish the foregoing in order to maximize the commercial development of ELV's in an equitable fashion, while reducing the role of the government in the process.

NASA has negotiated an agreement with General Dynamics Corporation for the operation of Atlas/Centaur ELV's. Pursuant to Section 110, Public Law 98-52, this Agreement was forwarded to the U.S. Congress on September 8, 1986, for 30-days review.

Question: What is the impact of the Shuttle flight downtime on NASA commercial space projects?

Answer: The Office of Commercial Programs (OCP) activities relate almost exclusively to payloads that are Shuttle-dependent. There are two notable effects of the Shuttle downtime on OCP programs.

First, the Shuttle downtime will affect our ability to obtain timely manifesting of Shuttle-dependent projects and payloads. This problem is compounded by an uncertain future flight rate. If we assume a downtime of two years, it is reasonable to assume that the current demand for commercial development payloads will not be satisfied until well into the 1990's.

Agreements such as Joint Endeavor Agreements (JEA) and Space System Development Agreements (SSDA) are used by NASA to encourage private sector investment in the commercial development of space. With the Shuttle grounded, this incentive for attracting private sector involvement in space-based activities is not as effective. Consequently, the second primary effect of the downtime will be an interim adjustment in the focus of the office. OCP will still offer these agreements and is actively seeking to increase private access to launch opportunities aboard the Shuttle, when flights resume, in early 1988. However, it is now more appropriate that we focus our energies on other facets of the commercial development of space such as increased private sector utilization of other government capabilities and government-developed technology, especially where NASA resources are highly leveraged with private sector dollars.

Question: The amended budget reduces funds requested for commercial programs by $4 million, and amount for commercial use of space by $6.4 million. What impact will these cuts have?

Answer: The reduction in funds for the Office of Commercial Programs of $4 million is included as part of the $6.4 million cut in the Commercial Use of Space Program. At congressional request, we will sustain the Centers for the Commercial Use of Space Program and the R&D Enhancements Program will be adjusted. A transfer of funding from the Commercial Use of Space of $2.4 million will be made to the Technology Utilization Program for outreach. This transfer will take place because of a shift in emphasis in outreach activities as a result of the Shuttle downtime. With the backlog of payloads, NASA cannot promise flight dates for years into the future for new companies which might like to fly future JEA projects. Therefore, our outreach activities will not emphasize flight activities. While we will continue to sign JEA's, during the next few years the use of other existing capabilities and technologies will be emphasized to assist companies in pre-flight development activities.

International Participation

Question: What is the status of negotiations with potential international partners for cooperation in the development and operations of the Space Station?

Answer: On June 13, the U.S. provided texts of both the Government to Government Agreement and Agency to Agency Memorandum of Understanding to Canada, Europe and Japan. Since then, we have had three negotiation sessions with Canada, one with Europe and two with Japan. Our goal is to finish the negotiations by the end of the year, allowing enough time for each of the partners to complete their internal approval procedures so that the agreements can be signed prior to the start of Phase C/D.

Question: Is the Station a U.S. Station or an International Space Station?

Answer: In the State of the Union message of January 1984, the President directed NASA to develop a permanently manned Space Station and invite other countries to participate. In his radio address on January 28, 1984, the President stated that two elements of the U.S. approach to space are a permanently manned Space Station and international cooperation. The international partners Canada, Europe and Japan are proposing to spend approximately $4 billion on Space Station hardware, which is 50 percent of the planned U.S. investment. Thus, regardless of what we call it, the Space Station will be significantly enhanced by international cooperation. Importantly, these foreign expenditures represent significant proportions of each of the partners' total space budget. At the same time, NASA recognizes the magnitude of the U.S. investment and the importance of protecting U.S. interests. It is not surprising that just as the U.S. is interested in securing benefits from its participation in the Space Station commensurate with its investment, so are the international partners. The goal of the negotiations is to structure the international participation to achieve that balance of investment and benefits.

Impact on Standdown on NASA Programs

Question: What percentage of DOD payloads will NASA be flying in the first three years (1988-1991) once you resume flying?

What percentage for Space Station?

Answer: The percentage of DOD payloads is 48 percent. Space Station will not be deployed in this timeframe.

Question: Will NASA purchase ELV's for any of its payloads to help remove the backlog?

Answer: NASA is still formulating its plans to determine how best to support launching of NASA payloads that have been affected by the Challenger accident. In addition, our current and proposed budget requests have no provision for the procurement of Expendable

Launch Vehicles that could be used for some of these NASA payloads.

Tethered Satellite System

Question: Do you have any idea when this payload will be launched?

Answer: The STS 51-L incident and resulting Shuttle downtime has caused a delay of the first Tethered Satellite System (TSS) mission. Currently, the first TSS mission is planned for 1990.

Question: What is the current estimate for the NASA Development Program costs?

Answer: The NASA Tethered Satellite System total development Program costs were estimated at $60 million in the President's FY 1987 Budget runout. The delay of the first TSS mission from September 1988 to 1990 will result in increased development costs. Development schedule and cost assessments consistent with the 1990 launch date are currently underway.

Question: What proportion of the total development costs is it currently anticipated that the U.S. will provide.

Answer: The NASA Tethered Satellite System costs which were contained in the runout of the President's FY 1987 Budget were $60 million for development and $9 million for first mission Science. Delaying the first mission from September 1988 to 1990 will result in increasing both of the above costs. Assessment efforts are currently underway to define the extent of that increase. The Italian Government has authorized $160 million for Tethered Satellite related costs. It was previously estimated that an equivalent cost in excess of $100 million would have been required to meet the September 1988 launch date.

Question: Are there still any of the key hardware development items that require significant technological breakthroughs?

Answer: The Tethered Satellite System Hardware is being developed using current technology. No technology breakthroughs are required to develop the TSS hardware.

Defense Bill Funding

Question: The Defense bill funding and language regarding a replacement Orbiter withholds obligations on a replacement Orbiter until August 1987.

What impact would the August limitation on obligation have on the Orbiter delivery schedule?

Answer: A delay in initiating the procurement of the replacement Orbiter until August 1987, would cause a delay corresponding in the delivery of approximately ten months compared to the Presidents budget amendment request. Even more important in the near term is the fact that such a delay would increase the schedule risk by causing the loss of capability at several critical subcontractors. These vendors will close down their Orbiter related manufacturing activities between now and August 1987. Furthermore, the prime contractor's in-house capability would be lessened as experienced technicians and engineers could not be retained.

Question: What estimate do you have of the cost of maintaining critical production capacity until August?

Answer: The minimum estimate to maintain critical production capability until August is approximately $40-50 million. This amount of funding would be used to productively retain critical skills at Rockwell and certain manufacturers which are going out of business, to initiate procurement of some long lead items, to perform certain planning activities and to negotiate a firm proposal.

Question: How significant is the delayed funding availability to other components of the DOD appropriation -- especially TDRSS and the IUS support equipment?

Answer: The impact on the IUS airborne support equipment (ASE) replacement is significant. NASA and DOD agreed some time ago that the ASE was critical to the IUS Program in order to maintain the ability to fly IUS spacecraft in a manner both agencies required. Since the Challenger accident, only one set of ASE remains to support the growing NASA and DOD IUS manifests, which is assumed to include the three planetary missions removed from STS/Centaur (Galileo, Ulysses, and Magellan). Since the second ASE was lost while supporting a NASA mission (TDRSS 2), NASA accepted responsibility for replacing it, and informed DOD in early summer of this acceptance. DOD proceeded to procure the long lead materials to support production in a manner that would make the replacement ASE available to support our joint requirements upon resumption of Shuttle flights. Payback by NASA to DOD for these long leads was assumed to begin in October or November 1986. If funding were to be delayed until August 1987, this would mean that DOD would be funding the NASA commitment for an entire year.

Question: Will "full funding" of the replacement Orbiter permit an acceleration of the procurement?

Answer: It is believed that "full funding" of the replacement Orbiter could permit an acceleration of the Orbiter manufacture by allowing funds to be applied at a faster "up front" rate, thus moving forward some critical items. The extent of any improvement has not been determined at this point.

Orbital Maneuvering Vehicle

Question: The NASA revised FY 1987 budget reduces the remotely piloted Orbital Maneuvering Vehicle (OMV) by $25 million to $45 million. In the Conference Report on the FY 1986 Appropriations Bill (H.R. 3038) Report 99-363, we provided $5 million for a flight telerobotic system and a smart front end for the OMV for remote operations and servicing. An additional $5 million was added in the FY 1986 Urgent Supplemental (H.R. 4515) Report 99-649 for a flight telerobotic servicer.

What is NASA's current plan as to when the OMV will be available and what capabilities relating to a smart front end are being developed?

Answer: Even with the slowed startup, the OMV is scheduled to be available for launch in November 1991 to support the reboost of the Hubble Space Telescope.

The flight telerobotic system development was assigned to the Goddard Space Flight Center (GSFC) in May 1986. The detailed plan is being developed by GSFC and will be available in October. The $5 million provided by the FY 1986 Appropriations Bill has been authorized to the field centers. The additional $5 million will be released after receipt of the plan from Goddard and its approval.

Centaur

Question: What is your current estimate of the cost of terminating the Shuttle-Centaur program, including the development of an alternative upper stage?

Answer: The contractors' are still preparing the exact termination costs for the Shuttle-Centaur program. We do have estimates of the total program cost which include the work completed prior to termination, completion of hardware which is compatible with Atlas-Centaur or the Titan IV launch vehicle, completion of work which was so close to completion that termination would have cost more than completing, and rough contractor termination costs.

An alternative upper stage trade study for the planetary missions is currently under way. However, we do not plan to develop a new upper stage for these missions. IUS options seem to be the leading contender at this time for these missions. If the IUS should be selected to support all three planetary missions (Galileo, Ulysses and Magellan), we estimate that the cost would be approximately $425 million for DDT&E to modify the existing two-stage IUS to accommodate the planetary spacecraft, three IUS and one PAM-D vehicles (the Ulysses mission requires an IUS plus PAM-D), and the mission unique.

These costs are estimates since proposals will not be requested from the contractors until a final decision is made by the Administrator.

Construction of Facilities

Question: Where in priority order in your revised budget does the Goddard Spacecraft Integration Facility come within the Construction of Facilities account?

If partial funding for this facility is provided in FY 1987, will NASA request the remaining funds in FY 1988?

Answer: The Goddard Spacecraft Integration Facility is one of thirteen discrete or major projects in the NASA initial budget request for FY 1987. To accommodate the $15 million offset in the amended budget request, a further review of the needs and relative priorities for all thirteen projects will be made to determine which projects can be deferred with the least impact to NASA operations and responsibilities. The Goddard facility will be a candidate for deferral along with the other twelve discrete projects. A decision on the selected projects will be made by the Administrator.

If the first phase of the Goddard facility is retained in the amended budget request and Congress appropriates the required funds, we would request the second and final phase of the project in FY 1988.

Role of Orbiter to Space Station

Question: How critical is the shuttle for assembly and maintenance of the Space Station? (a) Does NASA need four orbiters to build the Space Station? (b) Is there anything unique about the shuttle in terms of its utility for Station assembly and maintenance? (c) Is NASA considering use of ELVs for assembly or maintenance of the Station?

Answer: We have optimized the Space Station to be compatible with the shuttle, and we have used the contour of the shuttle cargo bay to partially define the outside configuration of some of the Space Station modules. We have revised our assembly sequence to require five to eight shuttle flights per year. The shuttle is also critical for the assembly and maintenance of the Station because it is the only man-rated transportation vehicle available to provide crew rotation.

(a) The Space Station transportation needs are not a function of the number of orbiters in the fleet, but rather the number of orbiters that are available to the Space Station based on the priorities of NASA and the launch requirements of other agencies.

(b) The shuttle is unique because it is a man-rated vehicle and because it is currently the only transportation system that can provide the transportation necessary to return payloads from the Space Station to Earth.

(c) The Space Station design concept as currently configured is compatible with the shuttle for assemble and logistics support. The Space Station is being designed so that it and the shuttle function as a matched pair. However, NASA is conducting a technical feasibility analysis as to how ELV's could be used to assemble and logistically support Space Station operations.

Cost Study

Question: What is the current total estimate for Space Station definition and development? (a) How confident are you that such an estimate can be met? (b) What are your plans for refining the projected cost estimates over the next several months?

Answer: Space Station definition and development has been estimated at $8 billion in FY 1984 dollars, and we have not changed that estimate. There is no doubt that a Space Station of some configuration could be built for that cost. Upon completion of the final Space Station configuration, design, and work package assignments, we will conduct a thorough cost review of all involved centers and potential major contractors. A preliminary review of center costs will take place in September with reviews at the contractors in November and final center reviews in November and December. We intend to establish a firm cost estimate of the baseline configuration by the end of January. If that estimate exceeds the $8 billion estimate, we will develop a position on how that configuration would have to be modified to fit within the $8 billion.

Space Station

Question: Is NASA now envisioning a man-tended Space Station operation? (a) For what period of time? (b) What types of experiments would be conducted during this time period? (c) What are the initial savings permitted by the evolutionary man-tended approach?

Answer: The assembly sequence for the Space Station recommended by the Critical Evaluation Task Force provides for the incorporation of attached payloads at launch #3 and for placing the U.S. laboratory module in orbit at launch #6. At launch #6 then, man-tended station operation by visiting crews becomes possible.

(a) Present plans call for man-tended operation during the assembly period from launch #7 through #11 when the permanently manned capability will have been achieved.

(b) The experiments which could be performed in a man-tended mode would primarily be selected from the area of observational sciences such as astrophysical surveys, Earth observation, solar physics, and plasma physics. Some short duration laboratory experiments in the areas of technology development and microbiology might also be performed.

(c) Starting the design and development phase as planned in the President's FY 1987 budget and assuming three years of man-tended operations, $284 million (calculated in FY 1984 dollars) could be deferred through FY 1991, assuming the mobile servicing center is developed by the U.S. for about $.5 billion. The total cost of the permanently manned Space Station, should a man-tended operational status be held for three years, would be $1.044 billion more through FY 1987 than the $8 billion needed to complete the permanently manned facility on its presently planned schedule.

Space Station Review

Question: What are the objectives of your ongoing technical review of Space Station configuration and design? (a) Given the comprehensive scope and fundamental nature of the review, should the Congress delay the initiation of Station development until NASA is fully prepared to proceed? (b) Why should we proceed with initiation of development in FY 1987? (c) Has the controversy over your June 30th Space Station work package realignment been resolved? (d) When and how will you implement your announced consolidation of Space Station management in Washington, D.C.? (e) How do you expect that consolidation to address the recommendations of the Rogers Commission?

Answer: The objectives of the technical review are to reassure ourselves that we have the best technical solutions to Space Station design issues in light of concerns regarding space transportation requirements and capabilities, extra vehicular activity (EVA), and safety.

(a) NASA believes the Space Station program is well defined in both a technical and managerial sense and is ready to proceed to Phase C/D design and development.

(b) Space station development should begin as planned in FY 1987 for several reasons. The extensive Phase B definition and preliminary and design studies have provided a solid technical understanding of Space Station architecture design. The framework for program management has been established. Private industry in the United States is ready to go and has expended significant monies in anticipation of starting development next year. Our international partners are looking for a signal that their own budgetary and intellectual resources can safely and productively be devoted to a cooperative Space Station program with the United States.

(c) The Associate Administrator for Space Station has presented a recommendation on the realignment of Space Station work packages to the NASA Administrator.

(d) NASA hopes to implement the consolidation of Space Station management shortly.

(e) As recommended in the Rogers Commission report, NASA will strengthen the Headquarters role by establishing, for the Space Station Program, in the Washington, D.C. area, a Level A' management level responsible for technical direction.

Automation and Robotics (A&R)

Question: The Subcommittee has advocated a strong Automation and Robotics Program to increase the Space Station operational efficiency. What efforts does NASA now plan to undertake that it had not envisioned two years ago? (a) What was the level of funding provided for Space Station A&R in FY 1985? (b) What do you anticipate for FY 1986? (c) How much is contemplated for FY 1987 in your revised budget? (d) Is the Advanced Technology Advisory Committee still meeting? (e) When are their next two reports due to be submitted to the Subcommittee?

Answer: A key project that has been added to the Automation and Robotics (A&R) Program is the Flight Telerobotics System described in the July 21, 1986, letter from the NASA Administrator to Chairman Boland. This project, estimated to cost about $160-210 million dollars in addition to the estimated $8 billion Space Station budget, will include a flight test in the 1990-1992 period and a flight article in early 1993. In FY 1986, Congress augmented the Space Station budget by $10 million dollars for this project. The FY 1987 budget plan is for $20 million dollars ($10 million in the Office of Space Station budget and $10 million in the Office of Aeronautics and Space Technology budget). The system is designed to aid astronauts in the assembly, maintenance, inspection, and servicing on the Space Station. It will be transported from its storage location to the work site by the Orbital Maneuvering Vehicle (OMV), the Mobile Servicing Center, or the Remote Manipulator System (RMS). Detailed plans will be available in the October 1986 time period.

Answer 34 (a), (b), (c)

	FY 1985	FY 1986	FY 1987
	($ in Millions)		
Applicable Portion of Space Station Program Funding	3.2	5.5	3.3
Applicable Portion of Definition Contracts	----------7.7-----------		
OAST* Generic A&R R&T Supportive of Space Station	8.2	10.2	18.0
Flight Telerobotics System	-	10.0	20.0
TOTALS	11.4	33.4	41.3

*Office of Aeronautics and Space Technology.

(d) The Advanced Technology Advisory Committee still meets and submits a progress report to Congress every six months. The Committee meets formally at least twice year; it also holds additional meetings if more detailed examinations of the Space Station A&R program are required.

(e) The next two reports are: Progress Report No. 3, due in October 1986, and Progress Report No. 4, due in April 1987.

QUESTIONS SUBMITTED BY SENATOR LEAHY

Lose Out

Question: In his August 15 statement on Space Policy, the President states that as much as possible commercial launches will not go on the shuttle. They will be launched on private rockets.

The United States has led the world in manufacturing and launching communication satellites.

If a commercial communication satellite is ready to be launched before a viable private rocket launching capacity is available, will it be precluded from the shuttle by this policy?

Would it make sense to divert paying customers from the shuttle to foreign launchers?

Answer: As the President's policy states, commercial communications satellites will not routinely fly on the shuttle. Although there are provisions for exceptions to this policy, NASA does not know at this time precisely how the exception decisions will be made. But the timing and viability of private launch companies must be taken into account in order to be as fair as possible to those entities which have waited in good faith for a launch.

NASA firmly endorses the development of a U.S. private sector launch capability. It is hoped that private launch companies will be operational quickly in order to relieve the backlog of payloads due to shuttle downtime and avert a shift of domestic customers to foreign launchers.

QUESTIONS SUBMITTED BY SENATOR LAUTENBERG

ACTS -- International Competition

Question: I would like to address the funding of the Advanced Communications Technology Satellite program. Both the Europeans and the Japanese are working on similar technologies. The Europeans are spending $200 million this year on an ACTS-type satellite, which they plan to launch in early 1991. The Japanese are spending $160 million on their technology, which will be launched in late 1990 or early 1991.

In their FY 1987 authorization bills for NASA, the House and Senate committees authorized $95 and $85 million respectively for ACTS. These numbers were included specifically to address the tentative launch schedules of the Europeans and Japanese.

I strongly support my colleagues' actions. To my way of thinking, this issue has become one of foreign competition. The U.S. has historically led in the communications satellite arena, with benefits both to that industry and throughout our economy. Now we are facing a situation where we will cede that market to foreign competitors if we do not continue to support timely completion of the ACTS program.

Do you disagree that the U.S. communications satellite industry will be seriously set back if the ACTS satellite is not ready to be launched in a competitive timeframe with the Europeans and Japanese?

Answer: There could be substantial differences in a government funded advanced communication satellite from one that the private sector might develop to best maintain an competitive edge in the global communication market, thus only the U.S. telecommunication industry can best judge how they will be affected. It has been the Administration's position to invest public funds in basic advanced communication technology research and leave the development of commercially-oriented communication satellites to the private sector.

Question: If we fail to complete the ACTS program before the Europeans and Japanese establish their satellites, what kind of ramifications will we face 10 years from now in our communications networks?

Answer: The market for commercial satellite systems and launch services has been estimated to be about $2 billion, and the related markets for terrestrial facilities, ground stations, and customer interface equipment may be several times that of the satellite market. Whoever dominates the satellite market may hold a technical advantage in the ancillary communications market as well.

Question: I am committed to preventing the loss of another high-tech industry to foreign competition. It is my understanding that the European Space Agency, which operates on a subscription basis, has gotten more subscribers for their ACTS-type program than they asked for. It is clear to me that if we do not maintain the pace of development of this program, we will lose out to the Europeans and Japanese. What level of FY 1987 funding would you estimate is necessary to keep the ACTS program on a schedule that will guarantee competitive launch-readiness?

Answer: As you know $77 million was included for the ACTS program in FY87 appropriation bill, this level should maintain a competitive launch readiness. However, this would require that another Science and Application shuttle mission may have to be delayed one to two years.

Rotary Engine

Question: I would like to address the Rotary Engine Technology Enablement Program.

Development of a more fuel-efficient, versatile power plant such as the stratified charge rotary engine is necessary to enable the American general aviation industry to regain its competitive position. NASA's own studies have shown the advantages of technologically advanced stratified rotary engines in aircraft propulsion.

Do you support the conclusions of NASA's studies?

Answer: Yes, we support the study conclusion that advanced stratified charge rotary engines offer technology advantages in terms of reduced fuel consumption, fuel flexibility, reduced weight and improved high altitude operation. The rotary engine will provide a key technology improvement for future general aviation aircraft. While technology is certainly important, it alone may not be sufficient to overcome the severe economic pressures that the U.S. general aviation industry is currently facing. In order to regain its competitive position, the American general aviation industry must also deal with other issues such as liability insurance rates and production costs that are higher than those of our foreign competitors.

Question: This technology is also being pursued by the Japanese. What steps are you taking in funding this program to ensure that we do not cede this market to foreign competition?

Answer: The rapid rate at which rotary engine technology is now maturing is a result of the broad technology base developed since the late 1970's. The available technology base has led to recent business commitments by several engine manufacturers for application of rotary engines to general aviation aircraft. These commitments by private industry indicate the maturity of the technology for near term applications. For second generation applications, where the Japanese excel, NASA in-house research is being complemented with sponsored research with industry and universities to develop the fundamental technologies needed for the development of high speed, high power density rotary engines that takes advantage of the high temperature materials technology currently being developed for heavy duty diesel engines. NASA's rotary engine research includes support of a John Deere experimental effort to develop high-pressure fuel injection techniques and to characterize the performance of high-speed rotary engines. The university and in-house efforts emphasize computer prediction method development and verification for gas flows in rotary engines and the use of ceramics to improve overall engine efficiency. Technology efforts currently under way in ceramics, diesels, turbomachinery and lubricants (supported by NASA, DOE, and DOD), are also strongly applicable to advanced rotary engines. Continuation of specific rotary engine research at the current level of slightly less than $2M, coupled with the other technology efforts under way, will provide the key technology developments for advanced high-speed rotary engines on a timely basis to maintain our competitive position for general aviation engine technology.

Changing Balance Between Civil and Military Space Spending

Question: In 1965, the U.S. Government spent over $9 billion on space. Almost three quarters of that, ($16.7 billion) was spent by NASA. Less than 25 percent ($2.1 billion) was spent by DOD.

By 1985, in constant 1972 dollars, total spending on space was down, to $7.6 billion. What's more, the balance had shifted. Less than 40 perent of funding was spent by NASA ($2.8 billion). Over 60 percent of it was spent by DOD ($4.6 billion).

I find that trend disturbing. It reflects a declining emphasis on civilian space activities.

Do you agree?

Answer: The comparison made is between the peak period of spending for the Apollo program when other applications of space were in a relatively early phase of development. There has been a major growth in funding for space activities in the DOD as well as in the private sector of the economy for space activities such as communications satellites. As this has developed, NASA has naturally become a smaller percentage of total spending for space activities.

This Administration has been very supportive of maintaining a strong civil space program. The centerpiece of President Reagan's space policy has been initiation of the Space Station. He most recently affirmed his support of the Space Station this past August when he sent to Congress a budget amendment to provide for a replacement orbiter. Under his administration, NASA has initiated several new major Space Science and Applications developments, such as the Upper Atmosphere Research Satellite, the Mars Observer, the Scatterometer and the Ocean Topography Experiment.

Shuttle Launch Priorities as a Reflection of the Militarization of NASA

Question: The Challenger disaster has made one thing crystal clear: the reliance of DOD on the Shuttle. We're told that DOD will take priorities over science and commercial missions. Do you think it is fair to say that the Shuttle is becoming more and more a DOD program?

Answer: No--the Shuttle is not becoming more and more a DOD program. Prior to the Challenger accident the DOD use of Shuttle was approximately a third of total capability. Because of the downtime due to the accident and the accumulated backlog of high priority missions for both National Security and significant science, a perception has developed that DOD is taking over all or most of the Shuttle flights. The facts are that in the first three years of operation after resumption of flights the percent of payloads will be approximately equal for National Security and Science (47 percent to 48 percent).

Question: Do you believe, as I do, that there is a real danger that science and commercial mission will be slighted in the future?

Answer: No--in the longer timeframes such as beyond the first three years the mixed fleet concept will be effective. The DOD share of Shuttle flights will be approximately 1/3 of Shuttle capacity. There will be adequate opportunities to fly science and commercial missions. However, in accordance with the recent Presidential decision commercial payloads will be limited to those which require the unique capabilities of the Shuttle or have foreign policy or national security implications.

Question: The DOD appropriations subcommittee has provided for $2.96 billion in the DOD appropriation bill for the Fourth Orbiter. Let's assume that is accepted by the committee and the Congress. Will that undermine NASA's independence; its civil mission?

Answer: Providing $2.96 billion in the DOD appropriation bill for a replacement Orbiter may reduce NASA's independence to a certain degree; however, if the program is implemented in an acceptable manner, this impact will be acceptable. What is important is that the Orbiter be manfactured and operated under NASA supervision. It is important that NASA provide the maximum amount of technical expertise available in its organization to insure safety of flight and mission success.

NASA's civil mission includes developing technical expertise and program management. The task of manufacturing, checking out and operating a new Orbiter contributes to NASA's civil mission and its basic function.

Competing Goals of NASA Program

Question: On the one hand, NASA is proud of its efforts to promote international cooperation. You speak of cooperative efforts with our allies. You mention the Topex satellite program. The space station also would involve foreign partners.

On the other hand, you refer to NASA's contribution to U.S. leadership in technology. That leadership has brought great economic returns to the United States.

To what extent are those two goals -- international cooperation and U.S. technological leadership -- at odds with one another? For example, can we take on partners in the space station, and also expect it to give us an edge over those same partners? Can we have it both ways? Do you agree that this is a dilemma for us? How do you address it?

Answer: Competition and cooperation need not be incompatible.

The same capabilities that make foreign space agencies increasingly able competitors also provide a basis for those agencies to take on a major role in joint projects. Our challenge at NASA is to continue to structure our international activities so as to maximize the benefits and minimize the risks, assuming always that our partners are doing the same. The most successful international cooperative projects are ones where each partner is pursuing its own primary interests and joining forces where those objectives overlap. In the Space Station Program each of our international partners represent users with a broad spectrum of requirements for capabilities which the Space Station will provide. By combining the Space Station infrastructure capabilities which all of the partners will provide, a larger spectrum of all partners' users needs will be accommodated. With adequate provisions for the protection of intellectual property, which we believe can be established, each of the partners will be able to use its share of Space Station resources to pursue its own desired activities -- be they aimed at furthering scientific knowledge or developing commercial opportunities in space.

Through international cooperation, we will be able to provide a more capable Space Station for all users. It is then up to the U.S. (U.S. Government and U.S. private sector) to develop and fund utilization programs that will maintain U.S. leadership in space.

QUESTIONS SUBMITTED BY SENATOR INOUYE

ATS

Question: Congress directed NASA to investigate an alternative to the ATS-1 and to submit its findings within 6 months. To date this report still has not been received. What is the status of this report, and when do you expect to submit your agencies report to Congress?

Answer: NASA completed its study on alternatives to ATS-1 for the Pacific Basin and submitted a report of its findings to both the Committee on Commerce, Science and Transportation and the Subcommittee on Science, Technology and Space on June 25, 1986. The transmittal letter to Senator Inouye was reissued on September 19, 1986.

Question: What is your Agency's current priority and intent with the Applications Technology Satellite Program?

Answer: ATS-3 is the only remaining satellite of the Applications Technology Satellite series still being used by an experimental user community on a daily basis. NASA considers the Applications Experiment Program to be important to the nation and will continue to support it with continued funding provided by the U.S. Congress.

Question: What was NASA's original intent when it made the ATS-1 available to the Pacific Basin in 1971?

Answer: Upon the completion of the ATS-1 technology validation period in 1970, it was NASA's intent to make available the remaining resources of ATS-1 to the Pacific Basin community for the purpose of conducting additional satellite experiments. The offer was extended to non-profit, non-commercial groups only. In 1971, the University of Hawaii proposed and was given approval by NASA, to conduct educational experiments using ATS-1. Approval was followed by the University's formation of the Pan-Pacific Education and Communications Experiments by Satellite (PEACESAT) project.

Question: What do you perceive NASA's role to be in the Pacific Basin?

Answer: NASA's role in the Pacific Basin, as it pertains to communications satellites, is to continue the support of an applications experiment program using ATS-3, and to continue to make available the resources of ATS-3 to former users of ATS-1 who are within the coverage area of the satellite. As a U.S. civilian space research and development agency, our efforts on developing communication technology will provide future benefits to the widely separated, less industrialized Pacific island nations. NASA is also prepared to support the needs of the Department of State in this area, upon the receipt of appropriate funding.

SUBCOMMITTEE RECESS

Senator LAXALT. The subcommittee will now stand in recess subject to the call of the Chair.

[Whereupon, at 10:55 a.m. Tuesday, September 16, the subcommittee was recessed subject to the call of the Chair.]

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